

## Opinion

### Where to next for Dairy shelter?

#### COMPOST BARNS HIGH RISK?

There have been regular articles published on compost barns, the articles to date however are a bit one sided and not very informative in respect of cost benefit alternatives or long term economic and risk impacts.

Compost barns as a solution to animal housing is indeed a very viable option if one has very high producing cows needing long term housing solutions with very high animal wellbeing standards. Overseas in some countries various models of compost barns are part of the mix, but they only represent a very small % of the total. Simply they are not for the fainthearted.

In NZ we have to-date very few dairy housing systems, as a percentage of the total dairy farms, there are an estimated 500 -600 shelters, i.e. areas which have cover and where cows can be held for a few days at a time and where there are no separate laying areas for the cows. Generally these shelters accommodate cows at between 4 and 5 m<sup>2</sup> / cow (not enough to qualify as long term housing systems under the animal wellbeing standards rules) These shelters do not include covered feed pads.

Then there are approx. 125 full free stall cowhouse or barn systems which do have separate laying areas automatic dung scrapers and feed lanes all under cover where longer term housing can be accommodated, be that wintering (90 days) or hybrid farming, where cows are "inside when they have to and outside when they can" and where often some feed is fed inside to give the cows time to meet their dry matter/ MS ratio intake and give them more time to rest and create better feed intake efficiencies. These systems have generally a space ratio of 6-8 m<sup>2</sup> / cow depending on its use. These systems do qualify for long term housing under the animal wellbeing standards.

There are to date very few 100% working compost barns, and there are also a few "wanabee" "look a like" compost barns. But we are reading that "this is the way forward" well I am not so sure of that, from where I am sitting and with my 30 odd experience in dairy, both in NZ and overseas I see a high risk system which is a totally long term unsuitable to our NZ farm system and this is why...

Compost barns rely on a high pack of organic matter over a large area and a low ratio of dung/urine to function properly, additionally regular daily aerating is a pre requisite to make them work properly as is the right overall PH and temperature of the "pack"

The system consequently depends on few cows / m<sup>2</sup>, so generally between 8 to 10 m<sup>2</sup> / cow is a minimum standard. Under NZ environmental standards the underlying ground needs to be sealed off to effluent pond standards. That generally means concrete.

As everyone knows composting only works if you continue to add the right compostable matter and turn it and do so regularly. Composting does not work well in stop start situations or in situations where the composition of the matter changes or when you forget to turn it. And it's in this space where in NZ we will have an issue, our farm system is not the same day by day week by week.... we are generally highly weather dependable so cows out on a sunny day means an interruption to the composting system, plus after a day or few days outside the composition of the

dung and urine changes.... all factors which create a risk the compost system stops..... and restarting a composting system on a working dairy farm where things happen every day and where the cows need shelter is highly unlikely.

The further south one goes the harder composting will be as the underlying ground is cold another aspect one needs to understand when embarking on a composting system. Many successful overseas (colder climate areas) compost barns have underfloor heating, often from waste heat from the generator which is driven by the biogas plant on the same farm system. This heat ensures the system stays warm and can function all year round. Additionally, most these systems are 100% housed every-day of the year so the inputs are the same every day and thus ensuring a high likelihood the system continues to work as expected.

But if this is not enough to put one off there is a simply economic reason, 10 m<sup>2</sup> per cow space means 3-4 m<sup>2</sup> per cow more than in a freestall barn. Every m<sup>2</sup> of concrete floor and roof needs to be paid for and it makes little difference in systems in what that cost will be. So one would need to spend 30-40% more / cow for the space needed / cow. Against this is that in a Free stall one invests in stalls and matting so you could argue these 2 balance themselves out.

Overseas research also indicated there is a potential pathogen risk (TAS) Thermophilic Aerobic Spore formers) this could affect milk quality and if it does could see this form of housing banned altogether.

Further more there is scientific evidence that compost barns can worsen the greenhouse gas emissions on a farm property with such a system.

Where the real differences come in are the day to day cost and the variable risks.

In a compost barn system one has to obtain substantial amounts of medium, be that bark, chip, straw whatever, this needs to be bought and brought in and paid for every year! With much of this type of material also identified as a source for biofuel the price will go North.... so potentially here is an uncontrollable risk of a major cost element which is uncontrollable, what makes this worse is areas where dairy housing will continue to grow as a mitigating solution to the wet and cold for instance Southland, wood chips are hard to come by as it is.

At some point every year the medium in a compost barn needs to come out and be distributed over the farm, again there is a massive cost here, one can argue however that that compost is beneficial to the earth and will add organic matter which will add to the fertility of the farm. That said the high level of organic matter may also need more N to assist decomposition, which in turn could lead to more N leaching, without extra N in year of application one may see significant pasture growth reduction while the next year a Nitrogen Bomb is set off.

However the most valuable component of that organic matter is the dung and urine which in the Free stall system is also contained and later distributed by effluent tanker or umbilical spray or drag boom system, in its in situ state undiluted cow sludge contains / ton 4 Kg of N of which 50% is readily available and 50% long term available so at an application of 10,000 Litres / Ha only 40 Kg of N is distributed.

The fact cows have been of pasture for a part of their winter and spring grazing reduces urine patches significantly and thus reduce leaching and better N utilisation is a beneficial result

One can argue the many pro's and con's back and forth and in the end it may come down to personal preference, but if it was

my farm I would like to control as many aspects of operation cost and management, pathogen risk control as I could get.

The biggest issues which cannot be argued are the risk that the compost system stops, at which point you are on a downward spiral of creating a basin of muck which within a relatively short time will see you being unable to house the cows as they simply end up wading in their own filth.

And unless you plan to house cows all year round, there is no benefit in investing for the extra space for cows to lay down as under a NZ hybrid or wintering only system and with relatively low production averages / year in comparison to EU cows, that comfort investment is simply not justified.

A study done in the Netherlands by the university of Wageningen gives some ins and outs which in context would be very similar to those in NZ with the variance that very few farmers in NZ would house cows year round.

Conclusion: in my mind a much more suitable system for NZ farms in general is a freestall system, you only pay once, up front and know that the building, stalls and matting is expected to last 20-30 years. The interest on this part of the investment is a small fraction of what it would cost to bring in the compost medium and you have a by enlarge controllable cost structure. The record of most systems in place have proven a level of return comparable to commercial investments and in general these are way above average NZ farm return of investment levels. Cow comfort and wellbeing have been improved with capital stock replacements reduced also. Feed intake and conversion of feed to milks solids improved and above all pasture has been protected, run off and mud avoided, N leaching reduced to very low levels and utilisation of on farm nutrients is nearing circular farming standards.

Harmen Heesen  
Disclosure of interest  
CEO TechniPharm Group  
Cowhouse Ltd consulting