COLD WEATHER BEDDING

- **Two ways to test whether our winter bedding is up to scratch.**
- **Consider both conduction and convection heat losses.**
- **Management tips for good cold weather bedding.**

On a chilly day this past winter I was standing outside at a dairy listening to a speaker. After a while I became tired and needed a place to sit down. I sat on a concrete step. Even with overalls, insulated jeans and long underwear as a cushion, I soon had to decide which was more uncomfortable: the discomfort from standing, or the pain from having all the heat sucked out of my backend by the cold concrete!

If you have had an experience like mine, you should be able to empathize with a calf with poor bedding, lying down in her pen or hutch during cold weather. The cold base underneath her serves as a heat sink. That is, the mass of the base (concrete, stone, dirt) is so huge that as long as she lies down she will continue by **conduction** to lose body heat. Remember that young calves lie down about 80% to 90% of the time.

Two ways to test whether our winter bedding is up to scratch

The calf's body weight is sufficient to compress most kinds of bedding (examples would include straw, sawdust, shredded paper). To accurately estimate the rate of heat loss through bedding we have to create similar compression.

An adult kneeling on the bedding is a practical way to do this (this is the first method of testing). While just two pens or hutches are better than none at all, I recommend kneeling in at least four or five locations to get a good picture of bedding adequacy.

If you kneel in a pen or hutch for roughly two to three minutes you should have a reasonable estimate of the heat loss rate experienced by a 50kg calf. Now, remember that this is influenced by how you are dressed. If you are wearing your thermally-insulated coveralls over lined jeans and super-thermal underwear versus just jeans, you will have to adjust your experience!

While kneeling, you may feel your knees (1) getting colder, (2) no change in temperature, or (3) getting warmer. If you do this test on a cold day and your knees get warmer, you can be sure that the bedding is doing a good job of insulating calves from the base.

If there is no change, you probably are in a marginal situation. The heat being transferred down through the bedding into the base (**conduction** losses) closely balances the rate of heat loss from your knees.

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However, if your knees feel cooler, the bedding is clearly not doing its job of insulating calves from the base of the pen or hutch.

When you stand up, it is helpful to inspect your knees. They should be dry. If they are damp and your knees felt cooler, you know one reason why so much heat is being transferred down into the base. Damp bedding is far more effective in transferring heat than that which is dry.

The second way to test for good bedding is to estimate nesting depth. This is how we estimate **convection** heat losses due to poor bedding. As before, a good estimate depends on observing more than one pen or hutch. I suggest for this measure that eight or 10 locations be checked.

If the bedding type you are using allows the formation of a depression, or nest, when a calf lies down, check the depth of those nests. The deeper the nest, the smaller the amount of air circulating in the micro-environment of the resting calf.

In a research report, dry hardwood shavings and straw bedding materials were compared. Temperatures averaged -7°C in the naturally-ventilated calf barn. Calves were fed to gain at least 0.5kg/day. Enough bedding was added to keep the pens dry. Success was measured as weight gained in 56 days. In two trials, calves on straw bedding gained between 2.3kg and 4.1kg more than those bedded on hardwood shavings. We may speculate that the major factor involved was the ability of straw-bedded calves to "nest" in their bedding. This nesting provides an insulating stable air environment. Perhaps nesting cut down body heat losses and left more energy for growth.

For below-freezing weather, I recommend a nest depth of approximately 10-15cm (4-6 inches) for effectively reducing heat loss. Some folks use the rule of thumb that bedding depth is sufficient if you can't see the calf's feet when she is lying down.

Management Tips

1. **Use clean bedding**. When added to hutch or pen our goal is to have bedding as free of soil, mould, and pathogens as we can maintain it. The first two of these contaminants can be assessed visually. It is especially important if using sawdust that you check for soil contamination. Soil, or more commonly "dirt," mixed with sand, sawdust, straw, corn stalks or any kind of crop trash can carry high loads of Klebsiella bacteria. I see a huge variation from "bright and clean" to "loaded with dirt" among on-farm bedding supplies.

2. **Be careful of dust.** Chopping bedding and blowing on top of calves and heifers can be a dusty business. However, when the bedding is "loaded with dirt" I believe this is especially risky for lung health. When I have been in barns where this is being done the suspended particle load appears almost beyond measurement! I have to run for my life or else risk coughing up black stuff for several days.

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3. **Dry.** When added to the pen or hutch the bedding should feel dry. This includes sand, straw, pea stalks, paper, wood shavings and sawdust bedding. Bedding materials that often contain undesirable moisture levels are those baled damp and those stored out-of-doors.

   If you are in doubt before the product is used for calves, you can use your farm's equipment for doing dry matter testing for maize silage and/or haylage. I use a 'Koster Crop Tester' for drying, although any oven will work, and a set of scales. I take a grab sample. I like to use an even amount to make the maths easier. Then, I dry it. Relatively dry bedding may only take 15 minutes before repeated weighings show no decrease in weight. Damp samples make take half an hour or more until the weight no longer goes down.

   I check my sample after 15 minutes and record the weight. I let it run 10 minutes more and check weight again. I repeat this until I get two weights that are very close. Then I stop and calculate my moisture level.

4. **Enough.** Add enough fresh bedding often enough to keep the bed dry 24/7. Regardless of the type of bedding, heat losses through damp bedding are enough in cold weather to seriously deplete the energy stores of young calves. Calves in negative energy balance (losing more energy than they consume) are good candidates for illness or even death.

5. Where possible, avoid the use of gravel, crushed stone, fines and sand as the sole bedding during cold weather. These are okay for a base but calves need bedding on top of them.

6. When economically feasible, consider a layer of wood-based bedding as the base layer for cold weather housing: 10cm of dry sawdust and dry wood shavings form a good insulating base. While both straw and chopped paper can form a good base, in practice I seldom see anyone add sufficient volume to do so. Stop and think about how much depth of shaken out straw or chopped paper it takes to form a 7.5cm thick layer when compressed repeatedly by a 50kg calf.

7. Just as you and I wear insulated clothes in sub-freezing weather, let us not forget we have the same option for our calves. This option is especially attractive if you are using a bedding type that does not permit "nesting." For a reference article and Internet links about blankets, go to www.calffacts.com and select "Blankets for Calves." Please send more links to products available in Europe to smleadley@yahoo.com .

Reference: T.M. Hill and Others, "Effects of feeding rate of milk replacers and bedding material for calves in a cold, naturally ventilated nursery," The Professional Animal Scientist, 23:656-664.

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