



SCC DIAGNOSTICS TOOL BOX



R-EF-6: Bedding and Bacteria

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What bedding is best?

There is no simple answer. Which bedding material you use depends on your housing, your manure system, availability, and cost. One thing that is always true is that to minimize mastitis, you must manage your bedding in a way that keeps bacteria counts down. Here are some questions and answers to help you do so:

How is bedding type related to bacterial growth?

The ability to support growth of mastitis-causing bacteria is an important difference between organic (straw, corn stalks, sawdust, paper, ground particleboard, sunflower hulls, oat hulls, barley chaff) and inorganic (washed sand) bedding.

All organic bedding provides food for bacteria. How much varies considerably. In general, paper has slightly less than either sawdust or straw. Hardwood sawdust or shavings have more than pine sawdust. The pine oil in pine sawdust tends to reduce bacterial growth.

Washed sand has no nutrients to support bacterial growth. However, this is only true when it is free of organic matter.

Bedding particle size is an important factor in bacterial growth (Table 1). Finely chopped or ground organic bedding favors more rapid bacterial growth than coarser bedding. This is especially true if it is a material that has lots of nutrients available for bacteria (e.g., oat hulls or corn stalks).

Table 1. Bacteria count on individual samples of various bedding types after particle size separation at zero time and after 24 hours incubation.

		Particle size		
		#8 (coarse)	#16 (medium)	Bottom (fines)
		----- cfu/ml -----		
Straw	zero time	462	933	1,400
	24 hours	43,000,000	45,000,000	99,000,000
Sunflower hulls	zero time	100	11,700	23,200
	24 hours	37,000,000	37,000,000	93,000,000
Hardwood shavings	zero time	0	0	0
	24 hours	33,200	40,000	90,000
Softwood shavings	zero time	0	20	20
	24 hours	0	100,800	300,000
Aspen sawdust	zero time	110	930	1,160
	24 hours	200	1,200	23,000

cfu = colony-forming units

NOTE: This table is NOT a ranking of bedding types. All of these beddings had acceptable zero time bacteria counts. These samples demonstrate the speed bacteria grow in the "fines" relative to the coarse and medium particle size bedding material.

When are bacterial counts in bedding too high?

Fresh, clean bedding will normally have bacteria counts lower than 5,000 colony-forming units per ml (cfu/ml) of bedding. Regardless of what kind of bedding you use, it is important to keep bacteria counts below 1 million cfu/ml of bedding. Anytime your counts are higher than 1 million, you should adjust your bedding management.

What causes high counts, and what can I do about them?

In order to grow, bacteria need moisture, nutrients, and a favorable pH. The addition of manure is the most important factor promoting rapid bacterial growth. Therefore, anything that reduces contamination with manure will reduce bacteria problems.

When managing bedding, consider the following:

- **Crowding** - More cows means more manure and urine. (Overcrowding also increases stall use and may result in more cows lying in alleys or failing to get enough rest, increasing general stress and/or compromising foot health.)
- **Nutrition** - "High"-group cows generally have higher intakes of a more nutrient dense diet and thus pass more nutrient-laden manure into their environment.
- **Stall Cleaning** - Remove soiled bedding from stalls at least every time you milk. Clean loafing areas daily. Studies comparing low SCC herds (<150,000) to high SCC herds (>250,000) found that stalls were cleaned an average of 2.2 times per day for low SCC herds but only 1.6 times per day for high SCC herds.
- **Alley Scraping** - The more frequent, the better. Scrape alleys at least every milking. Mechanical scrapers help maintain cleaner stalls.
- **Moisture** - Since bacteria require moisture, anything that can be done to reduce accumulation of moisture in the bedding will reduce bacterial growth in bedding. Slotted floors offer the advantage of draining all moisture immediately. Good ventilation can help, too.
- **Bedding Storage** - Keep bedding dry. The addition of moisture into unused bedding will increase bacterial growth before the bedding even makes it to the stall.
- **Weather** - Although you can't directly control this, you can be aware of its effect on bacterial growth and intensify bedding management to compensate.
- **Bedding Frequency** - Change organic bedding at least every other day -- every day during the summer. Replace sand bedding every five to seven days.

How should stalls be bedded?

The goal is to keep bacteria counts under 1 million cfu/ml where bedding contacts the udder. To accomplish this when using organic bedding:

- Remove all used bedding from the back half of the stall each day and replace it with fresh bedding.
- Don't move bedding from the front of the stall to the back of the stall.
- If you have stall mattresses, use a small amount of fresh bedding (about one pound per stall) every day, being sure that the cleanest and driest bedding is beneath the udder.
- Once each week remove all the bedding from the stall.

For sand bedding, place fresh bedding on the top of the surface, maintaining a level surface above the height of the curb. Attempts at "tilling" sand bedding to level it may not be wise since this brings the older and more contaminated sand to the surface.

How can I find out what the level of bacteria is in my bedding?

The Diagnostic Lab at the University of Minnesota does bedding cultures for \$18.00 per sample.

Collect representative bits of bedding from the rear of a representative number of stalls (e.g., every other stall). Place them in a one-gallon zip-lock freezer bag. Store the bag in a refrigerator or freezer until it is delivered or mailed to the laboratory. If the sample is mailed, it should be mailed in a Styrofoam container packed with ice and is best not mailed over a weekend.

Send the sample to: Veterinary Diagnostic Lab, Udder Health Lab, University of Minnesota, 1333 Gortner Avenue, St. Paul, Minnesota 55108.

It's best to work with your veterinarian in submitting the sample since your veterinarian will have the needed forms and can help interpret the results.

How can I tell if my bedding management is good enough?

Collect a representative sample of the bedding in the back half of the stall just before changing the bedding. Send the sample for culture as described above. If the sample has greater than 1 million cfu/ml, then follow these diagnostic steps:

1. Sample and culture bedding before it is placed in the stall to see how clean it is.
2. After re-bedding stalls, take a sample to culture every 24 hours until you re-bed again.

When the results come back you will be able to tell how often you need to bed to keep counts below 1 million cfu/ml.

Bedding strategies that work and do not work

As it is in many things in life, it is not what you do but how you do it that makes the difference.

Using no bedding does not work! Neither does doing a poor job of bedding (using too little bedding and/or changing it too infrequently).

Another common and faulty bedding practice is to pile lots of bedding in the front of the stall with the idea that the cows will drag it back or that you will move bedding from the front to the rear of the stall when you remove soiled bedding. While bedding in the front of the stall appears clean, it may be highly contaminated. Table 2 shows bacteria counts of bedding taken from the front, middle, and rear of the stalls on dairies that stockpile bedding in the front of the stall and then move it back to replace soiled bedding.

Table 2. Bedding bacteria counts in the front, middle, and rear of the stall on two Minnesota dairies that stockpile bedding in the front of the stall for replacement of soiled bedding under the udder.

Farm	Bedding type	Front of stall	Middle of stall	Rear of stall
		----- (cfu/ml) -----		
A	Ground sunflower hulls	3,850,000	9,925,000	27,275,000
B	Chopped straw & paper	690,000	19,000,000	41,000,000

