BEDDING CHOICES: MASTITIS CONTROL AND COW COMFORT

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TAKE HOME MESSAGES

- Proper bedding management for all production groups is critical for the effective control of mastitis and promotion of cow comfort.

- High moisture levels of organic bedding materials will result in rapid growth of environmental bacteria in the bedding contribute to high populations of bacteria on teat ends. Bacterial populations in organic bedding materials of small particle size will increase rapidly when contaminated and increase teat end exposure to pathogens.

- Inorganic materials such as sand do not support the growth of environmental pathogens and usually result in lower teat end bacterial counts and subsequently a lower new infection rate.

Teat end exposure to mastitis causing bacteria is the root of all mastitis problems. When the cow is standing, the probability for exposure is minimal. Eventually, cows will find a place to lie down, placing their teat ends in jeopardy. If the bedding material beneath the cow is clean and dry, the potential risks for mastitis are reduced. Cows evolved on pastures, so providing a resting environment closely simulating the cushion of grass is ideal. Many factors are involved in selection of suitable bedding materials on dairy farms including cost, availability, facilities design, cow comfort, ease of use, manure storage and disposal. This paper will explain the different choices for bedding materials and list the strengths and weakness of each type.

The purpose of bedding for housed dairy cattle is two-fold: cow comfort and mastitis control. Midwest dairy cattle housed in confinement typically spend a significant amount of time standing and walking on concrete. The stall base must provide adequate cushion to relieve pressure points from bony prominences. Padded mattresses can provide this, but use of mattresses does not eliminate the need for bedding. Bedding material also reduces the friction from the surface of the mattress. Without bedding, hock lesions will develop and can lead to significant lameness. In order to help reduce new intramammary infections, bedding must be able to absorb moisture and help decrease teat end bacterial contamination.

Bedding material can be classified as organic and inorganic. Organic bedding materials are typically plant byproducts and consist of straw, hay, saw dust, wood shavings, crop residues (corn stalks, cobs, etc.) shredded paper, composted manure or dried manure solids from a methane digester. They are used as bedding because they absorb moisture, are compatible with manure handling systems and are readily available. A major disadvantage of these materials is that they will support rapid growth of environmental mastitis pathogens when they become mixed with manure and moisture. Contaminating bacteria can multiply to large numbers within
24 hours. The major pathogens associated with bedding materials are the environmental
*Streptococci* and coliforms such as *E. coli* and *Klebsiella* spp. Many of these organic materials
initially contain high levels of potential pathogens shortening the life span of the bedding as an
effective barrier to bacterial contamination of teat ends. Sand on the other hand is the most
common inorganic bedding type. Inorganic materials do not support bacterial growth but can
lead to manure handling issues.

**SAWDUST AND SHAVINGS**

Wood-based products seem to be the most popular bedding material choices for dairy producers.
Availability of kiln dried sawdust and wood shavings can be problematic in some areas. Wood
products provide good cow comfort and work well in most waste management systems. The
biggest disadvantage is that sawdust and/or wood shavings provide an environment for mastitis-
causing microorganisms. Use of green, hardwood sawdust containing bark material has been
associated with *Klebsiella* mastitis. Bacterial numbers often increase with decreasing particle
size. Very fine sawdust from furniture construction may be nearly sterile prior to use but the
small particle size supports very rapid growth of bacteria requiring more intensive bedding
maintenance. Materials of fine particle size are more likely to cake on the teat skin leading to
high population of bacteria on the teats and greater opportunities for intramammary infection.
Wood products such as shavings, which have a much larger particle size, do not tend to cling to
teat skin and support slower growth of bacteria.

**STRAW**

Long straw has been used successfully in calving pens. Straw must be chopped to work well in
stalls. Straw, whether long or chopped can be too bulky for many manure systems. Use of straw
bedding is often associated with increased levels of mastitis from *Streptococcus uberis*
infections.

**PAPER**

Paper products are relatively inert initially. The biggest drawback is that they tend to stick to
cows and mat up when they get damp with urine or moisture. Bacterial numbers can increase
within 24 hours of contamination. Some manure systems actually handle paper better than other
wood products.

**HULLS**

Rice hulls provide comfortable bedding for cattle. Hulls can be relatively inexpensive, easy to
handle, and work well in liquid-manure handling systems. The big disadvantage is that rice hulls
can have high carbohydrate levels, which readily support the growth of microorganisms that
cause mastitis. Rice hulls have been shown to be a better medium for microbial growth than any
of the more commonly used organic bedding materials.

**COMPOSTED OR DRIED MANURE SOLIDS**

Composted or dried manure solids have also been advocated as bedding material. They have
been used successfully on some farms in the southwest where weather conditions contribute to a
very dry environment for most of the year. These materials are usually free of most major
environmental mastitis pathogens when initially applied however dried manure is an excellent
medium for bacterial growth once moisture from urine and fresh manure are added. In the northeast ambient humidity and air temperatures are not conducive to the effective use of dried manure solids or composted dairy waste as a bedding material in respect to reducing teat skin exposure to environmental pathogens. Composting offered little benefit toward net reduction in teat end contamination by coliform bacterial numbers in dairy waste solids. This may be due to the fine particle size and the smaller manure particles clinging to teat skin.

**RECYCLED MANURE SOLIDS**

With the advent of methane digesters, recycled manure solids have grown in popularity. One main advantage is the elimination of the finer manure solids from the bedding component. This creates a fluffier material that reduces compaction and is less able to cling to teat skin. The moisture level coming off the digester is rather high (70%). Using this product fresh on a daily basis can be an excellent bedding source. The types of bacteria needed to produce methane are typically not commonly found when culturing cows with mastitis. Yet, even this bedding source can become contaminated quickly when fresh manure, urine and/or milk are added.

**SAND**

Many consider sand to be the gold standard of bedding materials. It is inert and does not support the growth of bacteria. Sand should be of builders’ quality and contain little or no silt or clay. When properly maintained sand provides a very comfortable medium for bedding. Sand particles tend to move rather than compact, forming a more comfortable resting surface that conforms to the cow’s body. Bacteria counts of used sand bedding are often significantly lower than in organic bedding materials. Lower bacteria counts are associated with reduced rates of new infections with environmental pathogens. A big disadvantage to using sand is that it settles at the bottom of lagoons and manure collection pits and can cause excessive wear on manure spreaders, pumps, and separators.

**ADDITIVES**

Additives have been used in an attempt to extend the life of or lower the bacteria counts of bedding materials. This is often done when addressing a clinical mastitis crisis situation. Hydrated lime added to sawdust or shavings has been shown to increase bedding pH, and reduce its water content. Adding one to two pounds of hydrated lime per stall to bedding inhibited bacterial growth but may or may not reduce the incidence of clinical mastitis. The effect of added lime is short lived (less than 24 hours) and requires that lime be added daily. Research indicates that adding the lime to bedding prior to application and mixing just prior to use is the most effective means of reducing the bacterial population of existing bedding materials. Alkalizing and acidifying agents have been used to lower bacterial counts in sawdust and recycled manure. The antibacterial effects of bedding treatments were related to the pH of the bedding materials.

**MONITORING WITH BEDDING CULTURES**

Differential bacterial counts can be useful for evaluating bedding quality and management. Both used and unused bedding should be evaluated. To collect used bedding samples several ounces of material should be collected from the last 16 inches of the rear of the stall surface. Select at least six or more typical stalls. The material should be placed in a zip-lock bag and labeled.
Unused bedding should also be sampled from several areas of the bedding pile. Refrigerate the samples and send them to the lab on ice packs.

**MANAGEMENT OF BEDDING**

Many factors can affect the cleanliness and bacterial population of bedding. The amount and frequency of application is an issue on many of today’s farms. Many dairies today bed at weekly intervals and the use of rubber filled mattresses has displaced the use of bedding materials altogether on some farms. Organic bedding materials usually will often reach maximum bacterial populations 24 hours after the material is laid down. Facilities that allow accumulation of excessive amounts of manure, mud or urine will see a more rapid deterioration of bedding quality due to more severe contamination of the bedding. Moisture is an essential ingredient for bacterial growth. Bedding that is rained upon or absorbs moisture from the ground or other sources will have elevated bacteria counts.

Regardless of the bedding material used, good management and regular maintenance of free stalls are essential to ensure cow comfort and cleanliness, reduce the chances for injuries, and to prevent entrapment. Good maintenance can override the disadvantages of some bedding materials. Poor management can eliminate the advantages of any bedding choice. Observe the condition of the stalls daily; scrape manure and wet spots from the stall beds. Proper management is the most important aspect of bedding. No matter which bedding you choose, proper management determines how effective the bedding is in increasing cow comfort and reducing mastitis outbreaks.