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Reducing Bedding Bacterial Counts in Recycled Manure Solids

The following is based on an article by Sandra M. Godden and Erin Royster of the University of Minnesota.

The separation of liquid and solids, usually accomplished by use of a press or centrifuge method, is a necessary step to produce recycled manure solids (RMS).

In a recent study of Minnesota and Wisconsin, herds using recycled manure solids bedding, the mean (±SD) dry matter of post-pressed raw recycled manure solids was 30.8% (±4.1). The goal for solids is ≥35%. This processing step does not induce changes in microbiological concentrations. As such, **producers' intent on reducing bedding bacterial counts in ready to use recycled manure solids should consider the adoption of one or more secondary processing steps of either slurry (e.g. anaerobic digestion) and/or post-separated solids (e.g. composting, hot air drum drying, infrared drying)**.

Anaerobic digestion is a microbial process that degrades organic matter in slurry to produce biogas and digestate. Results of bedding cultures showed that, compared to green samples, digested samples had significantly lower log 10 counts of Klebsiella spp, (DIG = 0.12±0.40; green = 1.89±1.66) and numerically lower counts coliforms (digested = 2.77±1.62; green= 4.20±0.69), but no difference in counts of Streptococci and Strep-like organisms (SSLO) (DIG = 5.06±0.97; GRN = 5.78±0.57). **To summarize, research to date suggests that anaerobic digestion has efficacy in reducing BBC for some, but not all, mastitis pathogen groups, and that this processing step, if used alone, may not be sufficient to improve udder health.**

Composting may be accomplished by a variety of methods including windrow, static pile or aerated pile, with temperatures ranging between 105-150 °F. However, mechanical (drum) composting is more commonly used in the Midwest and Northeast U.S. states or Canada, where high humidity and frequent precipitation are common. In the latter system, separated solids pass through a rotating drum that mixes solids with hot air, heating the contents to over 150°F for a period of approximately 24 hours. A lab-based experiment by Fournel et al. (2019) reported fairly similar performance when comparing 4 composting methods (static windrow; turned windrow; or drum composter for either 24 or 72 hours), but concluded that drum composting for 24 hours offered the best compromise in terms of product quality, temperature reached, decreased bacterial numbers and emitted airborne contaminants.

Hot air drum dryers (e.g. Triple-Pass Rotary Dryer. McLanahan, Hollidaysburg, PA) take approximately 12-15 minutes to treat separated solids, with material exposed to approximately 700°F at entry and 130°F at exit. For infrared dryers (e.g. BluTeqInfrared, Edina, MN), a more recently introduced drying method, separated solids are augered 30-50 feet over approximately 14 minutes, exposing them to approximately 1,000°F from an overhead infrared heater. Either drying approach results in significant pathogen reduction and increases DM to 45-50% or higher.

In an observational study of 29 Midwest freestall dairies, results showed that hot air dryers and drum composters each reduced counts of coliforms, Klebsiella ssp., SSLO, and Staph spp, in ready to use recycled manure solids as compared to green samples.19 Furthermore, based on test day SCC data, the crude mean(±SD) test day prevalence of IMI (LS ≥4.0), incidence of new IMI, and proportion of cows with a chronically elevated LS, were lower in herds using either DRY or COM solids, as compared to herds using GRN solids bedding.

An important observation of note from this study was that while dry matter in ready to use recycled manure solids was increased after processing through hot air dryers (44.6%), dry matter was unchanged after mechanical drum composting (30.3%). This suggests that, while achieving higher bedding DM is a desired characteristic to mitigate bacterial proliferation, **a far more important consideration in reducing bedding**

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bacterial counts in ready to use recycled manure solids is to directly kill pathogenic bacteria through some form of heat-treatment.

Pictured at right is a thermometer in a composting pile with a temperature of 164 degrees. Below, are charts based on samples taken from the same farm and tested in the WVS bedding lab. The first chart is from fresh manure solids. The second chart is from 2-day composted manure solids.

Chart 1: Sample – Fresh Manure Solids

Date	Sample Type	% Dry Matter	% Organic Matter
3/11/2025	Manure Solids-Fresh	39%	

Bacteria	Bacteria/g of dry matter
Gram Negative Bacteria	2,590,038
Coliform Bacteria	582,759
Klebsiella Spp.	29,138
Streptococcus Spp.	242,816,092

Chart 2: Sample – Two-Day Composted Manure Solids

3/11/2025	Manure Solids-2 day old	42%

Bacteria	Bacteria/g of dry matter
Gram Negative Bacteria	915,813
Coliform Bacteria	8,863
Klebsiella Spp.	125
Streptococcus Spp.	1,211,236

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The Impact of Heifer Supply on Dairy Herds

The following is based on an article written by Michael W. Overton and Steve Eicker presented at the National Mastitis Council meeting in Charlotte North Carolina.

The consequence of the high beef values, over pursuit of beef-cross calves which resulted in fewer heifers produced, and diversion of some heifers into feedlots is the lowest recorded replacement heifer inventory as of January 2024 since 2004, according to the USDA. Many herds are now realizing that breeding decisions made 2-3 years ago were not appropriate to meet their ongoing replacement needs. Some of these decisions to pursue more beef-cross offspring and reduce heifer production were conscious efforts made by producers to reduce their heifer numbers and reduce costs. At the time these decisions were made, replacement heifers could be purchased for less than the cost of production.

A study was done on 44 Holstein herds that used Dairy Comp 305, as their herd management software and had monthly milk production recorded was collected and reviewed.

The conclusions from the study were herds that had fewer heifers calving, coupled with reduced replacement rates compared unfavorably year-over-year relative to herds with increased replacement potential. These short herds recorded fewer cows being sold, more dead cows, less milk per cow at the end of lactation, longer lactations, and more chronic mastitis. For all of the outcomes evaluated, there are varying degrees of lag between the reduction in replacement rates and measurable consequences. The differences between herd types described are likely to grow in magnitude before improvements are made.

Once a herd realizes their errors and modifies the breeding strategy, there is approximately a 3-year lag before heifers are potentially available as replacements. Producing a few extra replacement heifers beyond true needs seems economically justifiable.

Likewise, forcing "longevity" by restricting heifer supply and limiting replacement rates will result in lowered profitability, greater disease, and poorer welfare.