Cornell Waste Management Institute

Department of Crop and Soil Sciences
Cornell University

Rice Hall • Ithaca, NY 14853
(607)255-1187

E-mail: cwmi@cornell.edu
http://cwmi.css.cornell.edu

Using Manure Solids for Dairy Barn Bedding

http://cwmi.css.cornell.edu/bedding.htm

Ellen Z. Harrison, Jean Bonhotal and Mary Schwarz

Cornell collaborators include Susan Stehman and Frank Welcome, Cornell College of Veterinary Medicine; Ed Staehr, Quirine Ketterings and Caroline Rasmussen, Cornell College of Agriculture and Life Sciences. Six farm cooperators are engaged in the project.

The Cornell Waste Management Institute (CWMI), in cooperation with the Quality Milk Promotion Service (QMPS) program of the College of Veterinary Medicine, is engaged in a project to test and document the use of dried manure solids (DMS) as bedding at six dairy farms in New York State (NYS). With partial funding from the NYS Energy Research and Development Authority, the NY Farm Viability Institute, Cornell Cooperative Extension and the College of Agriculture and Life Sciences, research on a number of farms will help to provide needed answers.

Results from the current project will be available and posted on the CWMI WWW site in summer 2007. As described below, this project involves testing unused and used bedding and studying herd health on six farms. A new project will begin in 2007 to look at the impact of the frequency of bedding with DMS on pathogen concentrations in bedding.

BACKGROUND

Dairy farms in NYS are under increasing pressure to improve their management of manure. Increasing environmental regulations and neighbor odor concerns are factors encouraging the separation of manure solids rather than direct spreading of manure. Implementation of anaerobic digestion on farms for energy recovery and for odor management also generates manure solids. Thus, the need for a use for the separated solids becomes ever more apparent.

Bedding is a costly and time consuming component of dairy farming that has implications for herd health as well as the environment and economics. The cost and availability of bedding fluctuates and good consistent bedding can be hard to find and expensive. Some bedding materials (i.e. straw and sawdust) result in additional nutrients being brought onto the farm, adding to nutrient management concerns.

In the northeast, there is increasing interest in and some limited experience with the use of DMS, (the semi-solid [~25% solids] material derived from a manure stream run through a separator) for bedding. While interest is high, some veterinarians, farm advisors, and farmers are concerned that use of DMS will cause elevated levels of environmental pathogens that may negatively affect udder health (increased environmental mastitis) and milk quality.

The potential financial savings of using DMS are substantial and the potential to avoid bringing additional nutrients in bedding materials onto the farm is another benefit. Farmers using DMS report greater cow comfort than with other bedding materials they have used.

Sign up to receive emails about this project on our www site or contact Lauri Wellin (lew4@cornell.edu, 607-255-1187).

A summary of the literature on bedding materials and herd health can be accessed at: http://cwmi.css.cornell.edu/beddinglitreview.pdf.

PROJECT DESCRIPTION

Practices of Participating Farms

An array of practices are used on the six farms participating in this project including use of DMS directly out of a separator, use of manure that has been through an anaerobic digester prior to separation, and use of separated solids that have been partially composted in windrows and in-vessel composters.

To evaluate the acceptability of the various practices, data are being collected over the course of a year on the unused and used bedding materials and on herd health. On one farm, a side-by-side trial of sand bedding, bedding with DMS from a separator and separated DMS that has been partially composted (several days in a drum composter) will be run.

What's Being Studied

The Bedding

The parameters measured in unused and used bedding include the concentration of various bacterial and other pathogens (streptococci, staphylococci, total coliforms [*E. coli*, *Klebsiella* and *Enterobacter*], proteus, seratia, *Corynebacterium*, molds, and yeast). Johnes [*Mycobacterium paratuberculosis*] testing is being done on the unused bedding materials. In addition, physical and chemical parameters are analyzed on both the used and unused bedding materials including particle size, organic matter, pH, moisture, respiration/maturity, total phosphorus, extractable phosphorus, total nitrogen, nitrate nitrogen and copper.

Cow Health

The primary concern regarding the use of DMS for bedding is the potential impact on the health of the herd and its relation to milk quality. The farms where this project is being conducted participate in the Dairy Herd Improvement program (DHI). Under DHI, milk samples from each lactating cow are analyzed for somatic cell counts (SCC) and the farms track mastitis infections in Dairy Comp making analysis for each cow or for groups of cows feasible.

Hoof health is also a major farm concern and data for each cow is gathered and entered into the computer program. The farms will contribute these data to the project.

The health of teat ends is an important determinant of the impact of bacteria on milk quality and cow health. While bedding is not expected to impact teat end health, teat end health may result in differences in the way bedding materials affect SCC and mastitis. We will include quarterly teat end scoring by QMPS at the farm where the side-by-side comparison will be done. This will assess whether differences in teat end health between the groups accounts for differences we measure. We will also score teat ends twice at the other farms to help evaluate whether any observed mastitis is related to damaged teat ends rather than bacteria in the bedding. In addition, at the farm where we will do side-by-side comparisons, we will obtain teat swabs quarterly from approximately 20% of each of the three treatment groups. This will provide data about the bacteria actually on the teats to allow for comparison with bacteria in the bedding. The farms will also send samples to QMPS to identify the bacteria responsible for clinically diagnosed mastitis cases.

Nutrient Balances and Economics

Farm scale nutrient imports and exports will be documented to assess the impact of DMS bedding on the nutrient balance for each farm. An analysis of the economic impact of DMS bedding practices at each farm will be performed.

SHARING RESULTS

The results of this two-year project will be shared through open houses at the participating farms, presentations, fact sheets and articles. Students and faculty at SUNY Morrisville will have an opportunity to incorporate aspects of the project into educational activities to help assess the potential for using DMS bedding on their farm. As additional materials become available, they will be posted on the CWMI WWW site <http://cwmi.css.cornell.edu/bedding.htm>.