

Composting: Making Better Use of By-Products

Increasing pressures to address air and water quality impacts are affecting dairy producers everywhere. Simultaneously dairy producers must also provide milk and milk products to a growing population.

Urbanization and sprawl has driven land values up in many areas and owning enough land to dispose of manure in an environmentally responsible manner is increasingly challenging. Composting is a manure management tool that can help dairy producers reduce pollution and manage nutrients.

Composting is controlled decomposition, the natural breakdown of organic residues. Composting is most commonly an aerobic process, that is, the biological breakdown of the materials takes place in the presence of oxygen (air). The main byproducts of the breakdown are carbon dioxide, water and heat.

There are several benefits to composting; it can improve soil fertility, extend fertilizers, save water, suppress plant diseases, and boost soil tilth. Composting manures can improve manure handling and help to reduce the environmental impacts.

In many ways, composting is a natural fit for farmers. Ideally, the basics required for compost are readily available on the farm: feedstocks to be composted, such as livestock manure or crop residues; readily available bulking materials to thicken feedstocks, such as sawdust; and air, water, space and time. Microorganisms already present in the feedstock break down the material to a stable, beneficial product, free of pathogens and plant seeds.

In addition, dairy manure composted

in open windrows will emit less ammonia and VOCs compared to manure that is naturally degraded.

Let's look closer at some of these benefits:

Soil Conditioning

Compost is an excellent soil conditioner. When applied to cropland, compost adds organic matter, improves moisture retention (drought tolerance) and soil structure, reduces fertilizer requirements and reduces the potential for soil erosion.

Improved Manure Handling

Composting reduces the weight, moisture content, odor, and its attractiveness to flies. Compost is easier to handle than manure and stores well without odors or fly problems. Because of its storage qualities, compost can be applied at convenient times of the year.

Improved Land Application

Both compost and raw manure are good soil conditioners with some fertilizer value. However, there are benefits to be gained by composting manure.

Composting converts the nitrogen contained in manure into a more stable organic form. Although this results in some loss of nitrogen, the nitrogen that remains is less susceptible to leaching and further ammonia losses.

Manure containing high amounts of bedding has a high carbon-to-nitrogen ratio, and when applied to the land directly, the excess carbon in the manure causes nitrogen in the soil to be temporarily unavailable to the crop. Composting high-carbon manure/

bedding mixtures lowers the C:N ratio to acceptable levels for land application.

The heat generated by the composting process reduces the number of weed seeds contained in the manure, resulting in a significant reduction of weeds over several years of application.

While the nitrogen in compost is not as readily available as the nitrogen in fresh manure, the availability of potassium, phosphorus, and micronutrients from compost is similar-to, or higher than, that from fresh manure. Compost can be applied more uniformly and with better control than manure and can also be stored and applied when convenient. If compost is moved off the dairy site, it removes excess nutrients from the facility.

Lower Risk of Pollution and Nuisance Complaints

On a growing number of farms, manure is more of a liability than an asset. Disposal of manure is a problem where feed is not grown on the farm, when previously rented land is lost, or when herd size has increased beyond the farm's capacity to support it. Odor complaints are common in populated areas. Other concerns include runoff from manure spread in excessive amounts or on frozen ground, and nitrate contamination of wells and bodies of surface water. Composting can alleviate these problems.

Pathogen Destruction

Maintaining pile temperatures in excess of 1310F for a period of 3-days will destroy pathogens that can be problematic for both humans and farm animal.





Bedding Substitute

Compost can be used as a substitute for bedding materials. Research and experience have shown that compost is generally a safe and effective bedding material.

Revenue Stream

One of the most attractive features of composting is that there is a market for the product. Potential buyers include home gardeners, landscapers, vegetable farmers, turf growers, operators of golf courses, and ornamental crop growers. When used as a soil amendment, compost may suppress pests including plant diseases. In addition, there are numerous applications in the construction industry. In this instance, a disposal problem has been converted into a revenue stream.

In addition to the benefits of on-farm composting, there are several drawbacks, which must also be considered, such as time and money, weather, marketing, and diversion of manure and crop residues from cropland. However, composting dairy manure on-farm or at a regional facility may be part of the solution for reducing environmental impacts from dairy manure.

Available Resources:

- *"The Art and Science of Composting"* an Extension publication by Leslie Cooperband. It can be downloaded as a pdf file from the University of Wisconsin's Center for Integrated Agriculture (CIAS) website: http://www.cias.wisc.edu/archives/2002/03/01/the_art_and_science_of_composting/index.php
- *On-Farm Composting Handbook*. Rynk R, 1992. Northeast Regional Agricultural Engineering Service Pub. No. 54. Cooperative Extension Service, Ithaca, N.Y.; 186pp. A classic in on-farm composting. \$20 from NRAES, Cooperative Extension, 607-255-7654 or 607-254-8770. email: nraes@cornell.edu
- Farm scale composting resource list from ATTRA - National Sustainable Agricul-

ture Information Service: <http://www.attra.org/attra-pub/farmcompost.html>

- *Cornell Composting*: http://compost.ces.cornell.edu/composting_homepage.html

References:

1. An Assessment of Technologies for Management and Treatment of Dairy Manure in California's San Joaquin Valley, December 2005.
2. South Coast Air Quality Management District, Technology Assessment for: Proposed Rule 1133: Emission reductions from composting and related operations, Appendix C - Biofilters in operation at composting facilities in the United States, March 22, 2002.
3. On-Farm Composting Handbook, Natural Resource, Agriculture, and Engineering Services (NRAES) Cooperative Extension, Ithaca, NY, 1992.
4. Basic On-Farm Composting Manual, Report No. CM-97-3, May 1997, The Clean Washington Center.

Managing Manure by Compost

Brian Lepianka and his wife Danette own and operate B and D Dairy, which consists of 3,000 cows and heifers, in Pound, WI. In May 2006 a sales representative from D&D Equipment approached them about purchasing a composting machine.

By composting the manure from his 3,000 cows Lepianka would be able to create bedding for animals, reduce the volume of solids being spread, and potentially develop a profitable market for compost.

The machine was a small investment and could easily mount on the tractor he was already using for other farm needs, so Lepianka decided to give composting a try. After purchasing a Brown Bear composter he contacted his local land and water agencies to approve the acreage, secure permits and then he was in business making compost.

Once B and D Dairy started composting, they noticed an immediate reduction in the volume of manure and saw a savings in the reduced spreading. According to Lepianka there was more than a 50% reduction in volume and the financial savings more than offset the costs of converting the manure into compost.

After an initial trial using the compost as bedding for their heifers, they made the decision to continue using their standard

bedding material, sand. Once they decided to forego using compost as bedding, they ran an ad in the local paper for compost. Lepianka says they were quite impressed with the results. They had people coming with pickups, trailers and gravel trucks hauling off loads of compost. He admits, "If we were better marketers we could probably sell all of it."

Lepianka feels composting is a great opportunity for dairies located near urban areas. It would allow them to reduce the volume of manure and build a positive relationship with the communities surrounding them. Brian and Danette give their neighbors free loads of compost and it helps create a positive image for the farm.

The cows at B and D Dairy generate enough manure to create two windrows a week. The windrows need to be turned every 3 to 4 days in the summer and every 7 to 10 days in the winter. After one turn the odor from the manure is eliminated. The temperature inside the windrows reaches up to 140oF, killing weed seeds and fly eggs.

B and D Dairy uses a comprehensive nutrient management plan on their facility and has found composting makes manure application a little easier and safer.

Although composting takes a little time and investment to get started, the financial and environmental benefits that are reaped are well worth the effort it takes to get started.

The Lepianka family has benefited in several ways from composting and feels there is a lot of opportunity in composting for other dairy producers. Lepianka is quick to point out that he's no expert on the issue, but the experience has been very positive for their family farm.

For more information on composting and equipment contact Brown Bear, Ph. (402) 987-3412, email: sales@broyhill.com or log onto: brownbearmfg.com

