COMPOST DAIRY BARN LAYOUT AND MANAGEMENT RECOMMENDATIONS

K. A. Janni, M. I. Endres, J. K. Reneau, W. W. Schoper

ABSTRACT. *Compost barns are a loose housing system that provides excellent cow comfort for dairy cows. Producer experience with well-managed compost barns in Minnesota has generally been positive. Cows are relatively clean, very comfortable, have fewer lameness problems, and in some cases had lower somatic cell counts (SCC) after moving to a compost barn from tie-stall or freestall barns. Current design and management recommendations are based on dairy producer experiences. Compost barns have a concrete feed alley, a bedded pack resting area that is stirred two times a day, and a 1.2-m (4-ft) high wall surrounding the pack. The wall that separates the pack and feed alley has walkways to allow cow and equipment access to the stirred pack area. The stirred pack is sized to provide a minimum stirred bedded pack area of 7.4 m^2/cow (80 ft^2/cow). Producers use dry fine wood shavings or sawdust for bedding. Fresh bedding is added when the bedded pack becomes moist enough to stick to the cows. The pack is stirred (aerated) at least two times each day to a producer recommended depth of 25 to 30 cm (10 to 12 in.). Stirring aerates and mixes manure and urine on the surface into the pack to provide a fresh surface for cows to lie down on. The pack can provide manure storage for 6 to 12 months. Excellent pack management and pre-milking cow preparation procedures are required. Research on compost barns is needed.*

Keywords. *Dairy, Housing, Compost, Bedding.*

Compost dairy barns are a loose housing system that provides excellent cow comfort for milking, dry, and special needs cows. Experience with well-managed compost barns in Minnesota has generally been positive. Cows are relatively clean, very comfortable, have fewer lameness problems, and in some cases had increased milk production and lower somatic cell counts (SCC) after moving to a compost barn from tie-stall or freestall barns. Current design and management recommendations are based on dairy producer experiences. Research is needed on these housing systems.

Compost dairy barns require excellent pack and ventilation management for the barns to perform well. Producers need to use an adequate amount and type of bedding. The compost pack needs to be stirred twice a day to refresh the surface and enhance microbial activity in the pack. Compost barns will not perform well if the cows are overcrowded. Producers must use excellent pre-milking cow preparation procedures. Producers can have problems with compost barns if these guidelines are not followed. Compost barns are not the answer for every dairy producer.

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The authors are **Kevin A. Janni, ASABE Member Engineer,** Professor, Extension Engineer, Department of Bioproducts and Biosystems Engineering, **Marcia I. Endres, ASABE Member,** Assistant Professor, **Jeffrey K. Reneau,** Professor, Department of Animal Science, University of Minnesota, St. Paul, Minnesota; and **Wayne W. Schoper,** Extension Educator, University of Minnesota Extension, Sleepy Eye, Minnesota. **Corresponding author:** Kevin A. Janni, 1390 Eckles Ave., St. Paul, MN 55108; phone: 612-625-3108; fax: 612-624-3005; e-mail: kjanni@umn.edu.

The purpose of this article was to summarize our experience and knowledge of compost barns and management recommendations based on producer experiences. Information for this article was collected through interviews and discussions with producers with compost dairy barns. Initial discussions go back to 2001 when planning for the first compost barn in Minnesota began. A companion article summarizes the results of a descriptive survey of 12 dairy producers with compost dairy barns (Barberg et al., 2006b)

COMPOST BARN HISTORY

The first compost barn in Minnesota was built in 2001 and cows were moved into the barn by mid October. Today it is estimated that there are over 30 compost barns in Minnesota. The first barn was built by two dairy producer brothers in southern Minnesota who had read an article in a local farm magazine about a loose dairy housing barn in Virginia. The article described a loafing barn that used sawdust bedding over packed clay that was part of a low-input dairy loafing lot rotation system developed in Virginia in the 1980s and '90s. The low-input loafing barns were used during the rainy winter season. Producers in Virginia found that very finely ground sawdust worked very well for bedding. The low-input Virginia loafing barns were designed to provide 9.3 m^2/cow (100 ft^2/cow) or more of pack area per cow. Wagner (2002) described a visit to four Virginia barns, the dry shavings used for bedding, and tilling of the pack with a modified harrow one or more times a day to mix the bedding with manure. All of the Virginia barns visited had fans to aid cow cooling and to help dry the pack surface. Wagner (2002) recommended sizing the building so that freestalls could be added easily at a later date if desired.

In 2004 a series of farm newspaper articles were written and published describing the compost barns in Minnesota

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(Schoper, 2004a; 2004b; Reneau, 2004; Janni, 2004). These articles foreshadowed a presentation and article on compost barns that was part of the 2005 Minnesota Dairy Days presentations (Janni and Reneau, 2005). A compost dairy barn fact sheet was developed and put on the web (Janni et al., 2005). In response to continued questions, a compost dairy barn newsletter has been published monthly and posted on the web with these other materials (http://www.extension.umn.edu/dairy/management/compostbarns.htm).

Conventional Bedded Pack vs. Compost Barns

Conventional deep bedded pack barns are a common loose housing system generally used for housing dry and special needs cows. In deep bedded pack barns the bedding and manure accumulate before being removed and land-applied to cropland. Kammel (2004) summarized bedded pack design, management, bedding costs, advantages and disadvantages. Bedded packs or straw yards have been associated with high incidence of mastitis (Berry, 1998). Ward et al. (2002) reported temperatures, moisture content, and pH values found in straw yards of four dairy farms were conducive to the multiplication of *S. uberis* and *E. coli*. Compost barns are managed very differently than conventional bedded packs and this different management is believed to explain why producers with well managed compost barns are capable of maintaining low SCC.

Compost Dairy Barns

The compost barn design and management recommendations presented here are based on dairy producer experiences. Producers report excellent cow comfort, reduced SCC, and increased milk production. Some of the increased milk production and reduced SCC may be due to having more space per cow and other management and nutritional changes made at the same time the cows were moved into the new compost barn.

Briefly, compost barns have a concrete feed alley, a bedded pack area that is stirred two times a day, and a 1.2-m (4-ft) high wall surrounding the pack. The wall that separates the pack and feed alley has walkways to allow cow and equipment access to the stirred pack area. The stirred bedded pack is sized to provide a minimum resting area of 7.4 m^2/cow (80 ft^2/cow). Producers use dry fine wood shavings or sawdust for bedding. Initially, 30 to 50 cm (12 to 18 in.) of loose dry fine wood shavings of sawdust is put down. Several centimeters of fresh bedding are added every one to five weeks when the bedded pack becomes moist enough for it to stick to the cows after lying down on the stirred pack. The pack is stirred (aerated) twice a day to a recommended depth of 25 to 30 cm (10 to 12 in.). Bedded pack stirring is usually done with a modified cultivator or harrow attached to a skid loader or utility tractor. Stirring aerates the accumulated pack and mixes manure and urine on the surface into the pack to provide a fresh surface for cows to lie down on. Aeration enhances aerobic biological activity in the pack which generates heat. Adequate bedding and proper pack management are critical to the success of compost barns.

Compost Barn Layout

Figure 1 shows a typical compost barn layout. Compost barns are similar in many respects to typical freestall dairy barns (NRAES-76, 1995; MWPS-7, 2000). One of the key differences is that the freestalls and freestall alleys are replaced with a bedded pack area that is stirred at least twice a day.

The compost bedded pack area is sized to provide at least 7.4 m^2/cow (80 ft^2/cow) for 540-kg (1200-lb) cows. Some producers are providing 9.4 m^2/cow (100 ft^2/cow), which is the original cow density used in Virginia (Wagner, 2002). Based on manure production and cow size, Jersey cows weighing 410 kg (900 lb) are expected to need at least 6.0 m^2/cow (65 ft^2/cow). The stirred pack is sized to allow all cows to lie down at the same time and still have space for a cow to get up to go and eat or drink. It is hypothesized that compost pack area per animal depends on the amount of manure and urine added to the pack daily. The microbial activity and drying need to balance the amount of manure and urine added daily. A 16- × 35-m (52- × 115-ft) compost barn with a 3.6-m (12-ft) wide feed alley can house 57 dairy cows.

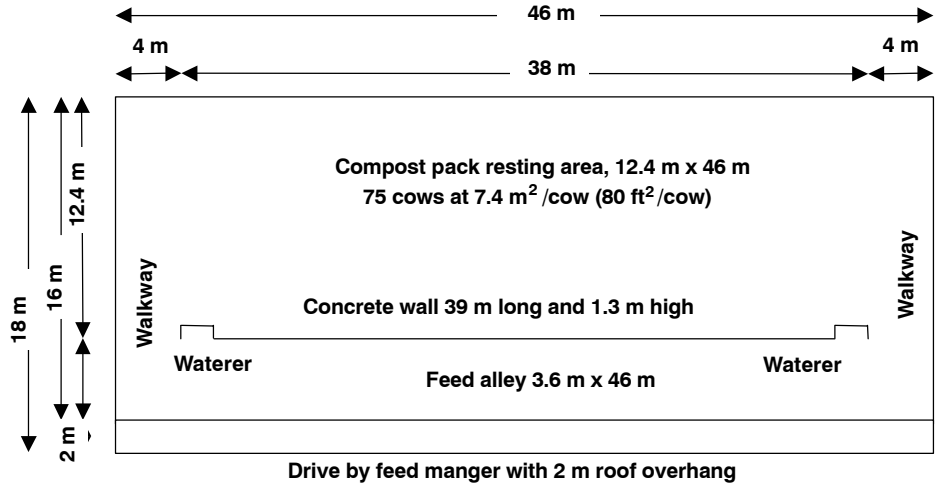

Figure 1. Compost barn layout for 75 cows with two walk ways, drive-by feeding and 2 m overhang. Waterers are against the concrete wall separating the compost pack from the feed alley and are accessed from the feed alley only.

A 1.2-m (4-ft) high wall surrounds the pack on three sides and separates the pack and feed alley. The exterior walls are usually cast-in-place concrete walls on footings below normal frost depths. Some producers have used wood for the exterior walls. The 1.2-m (4-ft) wall separating the bedded pack and the feed alley usually has a fence on top to prevent cows from walking over the wall. Usually the wall separating the pack area and the feed alley is cast-in-place concrete. Some producers have used moveable concrete panels with wider bases, called Jersey walls or road barriers to make the interior wall. Walkways, 2.4 to 3.6 m (8 to 12 ft) wide, are recommended at each end of the wall separating the bedded pack and the feed alley (as a minimum) for cow and equipment access to the stirred pack area. Wider walkways provide easier equipment access for adding fresh bedding and pack removal. In large compost barns, walkways are recommended every 35 to 40 m (115 to 130 ft) to provide cows more convenient access from the pack area to the feed manger.

Originally compost barns were built the same width as either two-, three- or four-row freestall barns based on a recommendation by Wagner (2002) to permit installation of freestalls at a later date if desired. One problem with retrofitting compost barns to install freestalls would be the presence of the walls surrounding the pack and their effect on ventilation at animal level. Building width impacts manger space. Recommended manger space varies from 46 to 76 cm (18 to 30 in.) depending on animal size and feed availability (MWPS-7, 2000). Building width can be balanced between manger space and pack area per cow. Table 1 gives approximate building widths for a drive-by barn for three manger spaces and three compost pack areas per cow. Each building width includes 30 cm (1 ft) for exterior walls and a 3.6-m (12-ft) feed alley.

Compost barns are recommended to have a concrete feed alley that is 3.6 m (12 ft) wide - similar to that recommended for freestall barns (NRAES-76, 1995; MWPS-7, 2000) - that can be scraped twice a day. Feed mangers are designed according to typical recommendations for freestall barns (NRAES-76, 1995; MWPS-7, 2000). Most Minnesota compost barns have drive-by feeding. Some have roof overhangs over the feed manger, some have covered feed driveways, and one has a center drive through feed alley with pens on both sides of the feed alley.

Waterers are located along the feed alley. Waterers can be located on either side of the feed manger or adjacent to the concrete wall separating the composting bedded pack and the feed alley. Access to waterers next to the concrete wall between the compost pack and the feed alley should be limited to only the alley side of the waterer. Waterers are not located in the bedded pack area to minimize wetting of the pack, to keep the waterers cleaner, and to avoid having to adjust waterer height as pack depth increases.

Table 1. Approximate compost barn building width based on manger space and compost pack area.

	Compost Pack Area, m^2/cow (ft^2/cow)		
Manger space	7.4 (80)	8.4 (90)	9.3 (100)
cm (in.)	Building width,[a] m (ft)		
76 (30)	14 (45)	15 (49)	16 (53)
61 (24)	16 (53)	18 (58)	19 (63)
46 (18)	20 (66)	22 (73)	24 (80)

[a] Building width includes 3.6-m (12-ft) feed alley and 30 cm (1 ft) for exterior walls.

Compost barns are recommended to have 1-m (3-ft) eave overhangs to minimize the chance of roof runoff and rain being blown into the barn onto the bedded pack. The ground surrounding a compost barn should be sloped to minimize rain and snow runoff from entering the barn and wetting the compost pack.

Lighting in compost barns is similar to that used in freestall barns (MWPS-7, 2000).

Bedding

Compost barn owners use dry fine wood shavings or sawdust for bedding. It is hypothesized that the fine particles improve handling, mixing, aeration, and biological activity. Straw and corn stalks do not work well. Producers that have tried chopped straw and corn stalks report problems stirring and aerating the pack. One producer has reported that a mixture of ground soybean straw and fine dry wood shavings works well in his compost barn. Until there is research on bedding alternatives, dry fine wood shavings and sawdust are recommended. Green or wet sawdust or shavings are not recommended.

One producer added cedar chips to a compost pack that had been performing well and reported that the pack became wet and cold and the cows avoided lying on the pack. Wood products professionals (H. Petersen, personal communication, 15 December 2005) and compost experts (T. Halbach, personal communication, 15 December 2005) indicated that cedar has natural oils and extracts that are anti-microbial. It was hypothesized that the cedar chips were inhibiting the microbial activity in the compost pack. Cedar chips are not recommended to be used as bedding in compost barns.

Shavings and sawdust from certain hardwoods including black walnut and cherry are also not recommended to be used in compost barns. Small amounts of black walnut sawdust are known to cause laminitis in horses (Cassens and Hooser, 2005).

Initially 45 to 50 cm (12 to 18 in.) of loose dry fine wood shavings or sawdust is put down to start a compost barn pen. Fresh bedding is added when the bedded pack becomes moist enough for it to stick to the cows after they rise from lying down on the composting bedded pack. Ten to 20 cm (4 to 8 in.) of fresh bedding is added every one to five weeks. Some producers are adding smaller amounts of fresh bedding more often, as often as a few times a week. Bedding storage is needed when bedding is added more often. The time between bedding addition and the amount added depends on cow density, weather conditions, and ventilating rate (air exchange); more bedding is needed during wet weather and cold weather and if there is insufficient air exchange.

Bedding is usually added to the compost barn pack with a skid loader with a bucket. Producers with bedding storage add bedding as needed. Producers without bedding storage add an entire load of bedding when it is delivered. Biosecurity should be considered when trucks that may have been on other farms are brought onto the farm or into the compost barn.

It is hypothesized that the fine dry wood shavings or sawdust are effective bedding materials in compost barns because they have significant amounts of lignin (e.g. 28% for pine), they provide a large surface area to volume ratio, and

they do not pack excessively between stirrings. The large surface area that the fine dry wood shavings or sawdust provide is expected to provide a large area for microorganisms to grow on to be available to breakdown the manure and urine added to the pack daily by the cows. Lignin resists microbial breakdown so it lasts a long time (NRAES-54, 1992). Some producers using alternative bedding materials have packs that compact more than those packs that are bedded with fine dry wood shavings and sawdust. Compaction is expected to reduce aeration and microbial activity compared to the fluffy loose packs found in barns using fine dry sawdust or wood shavings.

The availability and cost of dry fine sawdust for bedding is a concern to compost barn users (Barberg et al., 2006b). Our best estimate of annual bedding costs is based on a compost barn with 75 cows with a space allotment of 7.4 m^2/cow (80 ft^2/cow) that used 16 semi loads of dry fine sawdust. Assuming a cost of $850 per semi load, estimated 92-m^3 (120-yd^3) capacity of dry fine sawdust, the total annual bedding cost for the 75 cows is $13,600 or $181 per cow year. This rate is similar to that for conventional pack barns (Kammel, 2004). Bedding costs can be higher.

In Minnesota dairy producers can contact the Minnesota Department of Natural Resources Utilization and Marketing Program web site (www.dnr.state.mn.us/forestry/um/index.html) to access a forest products producer directory. Wisconsin has a similar web site (www.woodindustry.forest.wisc.edu).

Aeration

The bedded pack is stirred (aerated) at least two times each day while the cows are being milked. The compost pack in a well managed compost barn appears very loose and fluffy after aeration. One producer added tracks to his skid loader used for aeration to reduce compaction. This producer has also begun to stir the pack a second time if the first time around does not produce a fluffy pack. Packs in barns that are not performing well appear to be compacted and chunky after stirring. The very loose pack provides better aeration and aerobic conditions for microbial activity whereas the chunky pack indicates anaerobic pockets in the pack.

Experienced compost barn operators suggest that the pack should be stirred to a depth of 25 to 30 cm (10 to 12 in.) twice a day. Bedded pack stirring is usually done with a modified cultivator or harrow attached to a skid loader or utility tractor. The stirring aerates the pack to enhance aerobic biological degradation of the manure and urine. Stirring also mixes manure and urine on the surface into the bedded pack to provide a fresh surface for cows to lie down on after returning from the milking center. It is hypothesized that stirring also helps dry the pack by exposing more of the pack to air.

The labor for aerating the pack is similar to that needed in freestall barns that are scraped with a tractor or skid loader. Greater labor efficiency for aeration can be achieved by matching the cultivator width to the composting bedded pack width so that the job can be done in full loops.

Manure Handling

The stirred pack provides manure storage for 6 to 12 months. The stirred pack material is handled as a solid and typically cleaned out completely and land applied in the fall after corn silage is harvested. Fall clean out allows time for a new pack to accumulate and begin biological degradation before cold weather sets in. Most operators remove half to two-thirds of the pack in the spring before fields are planted to make sure there is sufficient space for pack accumulation during the summer when cropland is not available for manure application.

Producers should check local regulations to determine whether the bedded pack area can have a packed soil or clay base. Care must be taken to avoid disturbing the packed soil base during clean out and pack stirring when the bedded pack is less than 30 cm (1 ft) deep.

The concrete feed alley is scraped at least twice a day. Producers have estimated that roughly 25% to 30% of the manure is voided and removed from the feed alley. The collected manure and bedding dragged down from the pack by the cows are stored in an approved manure storage unit until land applied according to a manure management plan. The manure collected from the feed alley can be stored in a mini-pit either inside or just outside of the compost barn for short-term storage. One producer with a four-pen compost barn with a center drive through feed alley and a cross alley avoided building outdoor manure storage by using a portion of the cross alley as a mini pit storage. The operator can store 2 to 3 days of scraped manure in the cross alley. This setup requires land application year round; state and local regulations must be followed.

Some dairy producers interested in compost barns have asked if the manure scraped up from the feed alley can be added to the pack to avoid a mini-pit or external storage. The idea raises two concerns. One concern is the impact of the extra manure and urine on the pack moisture content and biological activity. It is our hypothesis that the amount of bedding needed depends in part on the amount of manure and urine added to the pack. Adding more manure may increase the amount of bedding needed. A second concern is distribution of the manure scraped from the feed alley on the pack. To avoid creating wet or overly manure-laden spots in the pack, the manure needs to be uniformly distributed over the compost pack. The additional traffic on the pack may lead to pack compaction and reduced aeration and biological activity. Because of these concerns, our current recommendation is that producers do not add the manure and urine scraped from the feed alley to the compost pack.

Compost barns require equipment to handle manure as both a solid (i.e. the pack) and a slurry (i.e. the feed alley manure). This increases a producer's investment in equipment.

Barn Ventilation and Location

Adequate ventilation (air exchange) is needed to remove cow heat and moisture as well as the heat and moisture that the biologically active pack generates. Sufficient air exchange is needed in cold weather to remove moisture from the pack and extend the time between bedding addition. Compost barns are typically naturally ventilated, which makes location very important. It is recommended that naturally ventilated compost barns be located in an open area where summer winds can blow through open sidewalls and the ridge in warm weather. Compost barns should be located at a slight elevation to the surrounding terrain to minimize rain and snow melt runoff from entering the barn and wetting the stirred pack.

Sufficient sidewall height is critical for enhancing natural ventilation and providing equipment clearance to the stirred pack. The sidewall height for a compost barn is recommended to be higher than that for a freestall barn to accommodate the sidewall opening lost due to the manure pack walls. Compost barns are recommended to have 4.9 m (16-ft) sidewalls to provide better ventilation and access for bedding trucks.

Ridge opening widths are typically similar to that for naturally ventilated freestall barns (MWPS-7, 2000).

Many compost barns have mixing fans located to blow air downward toward the stirred pack to help dry the pack surface. The fans must be hung high enough to provide head room for stirring equipment at the maximum pack height.

Compost Barn Bedded Pack

Management of the stirred pack is critical to the success of compost barns. Sufficient dry fine wood sawdust or wood shavings and stirring the pack two times a day is required to maintain cow cleanliness and biological activity to breakdown the manure and urine voided onto the pack. Experienced compost barn operators with higher cow densities note that pack moisture and condition changes everyday as the pack becomes wetter. The drier the pack, the looser and fluffier the pack can be after stirring. Compost barn operators observe that the pack compacts more as it becomes wetter.

Initial producer comments indicated that the pack was composting. Composting material can generate temperatures between 54°C and 65°C (130°F and 150°F) within the composting materials. These temperatures are needed to inactivate pathogens and viruses. Maintaining a temperature of 54°C to 65°C (130°F to 150°F) for 3 to 4 days favors destruction of weed seeds, fly larvae, pathogens, and viruses. Properly composted materials have minimal odor and provide a poor breeding substrate for flies and other insects.

While there is no detailed research on the effect of composting on mastitis pathogens, other compost studies indicate that optimum composting conditions can inactivate pathogens and viruses.

A field study by Barberg et al. (2006a, 2006b) found that pack temperatures were not sufficient to document that composting was being achieved in the pack. Field observations do indicate that the pack is aerobic and biologically active.

The information to date suggests that the pack in compost barns, while not composting, might be sufficiently biologically active to be inhospitable to environmental mastitis organisms and fly larvae. Additional research is needed.

Compost Barn Pack Nutrient Characteristics

Table 2 gives the average, standard deviation, low and high values of six characteristics of nine composite pack samples from six compost barns in Minnesota. The composite bedding samples were collected in nine pens in six different compost barns between 15 October and 15 November 2005 prior to the pack being removed from the barns and land applied. Individual samples were collected from four locations in each pen from top to bottom of the pack, thoroughly mixed prior to sending a single sub-sample to a commercial testing laboratory for analysis for total moisture (wet basis), total nitrogen, phosphorus (P_2O_5), potassium (K_2O), pH, and carbon to nitrogen (C:N) ratio.

All of the barns used fine dry wood shavings or sawdust for bedding. The initial bedding moisture content, while not measured, would be expected to be around 10% dry basis. Note that the wood industry typically reports the moisture content of wood products on a dry basis. Wood contains little nitrogen, phosphorus, or potassium. Estimated dairy manure production and nutrient levels for a 635-kg (1400-lb) lactating cow are total manure as excreted 68 kg/day-cow (150 lb/day-cow), 88% moisture (wet basis), 0.37 kg nitrogen/day-cow (0.82 lb nitrogen/day-cow), 0.19 kg P_2O_5/day-cow (0.42 lb P_2O_5/day-cow) and 0.21 kg K_2O/cow-day (0.48 K_2O /cow-day) (MWPS-18 Section 1, 2000).

The composite sample moisture content found prior to clean out was between 51% and 68% [wet basis (wb)], which is near the moisture content needed for composting (NRAES-54, 1992). The carbon to nitrogen (C:N) ratio of the pack material ranged from 12.2 to 20.2, which is below the preferred 25:1 to 30:1 C:N ratio range recommended for composting (NRAES-54, 1992).

Compost Barn Pack Moisture

Composting requires sufficient moisture for active microbial activity but not so much moisture to hinder aeration. Moisture content between 40% and 65% is generally recommended for composting most materials (NRAES-54, 1992). Urine, wet fecal material, and moisture from microbial activity are the moisture sources in a composting bedded pack. Stirring the pack both aerates and mixes moisture and manure into the composting bedded pack. Ventilation helps dry the freshly turned bedded pack surface to retard bacterial growth on the surface and keep cows cleaner since dry bedding does not stick to the teat or leg surfaces.

A simple mass balance on moisture indicates that moisture evaporation from the pack can be an important factor in the time needed between bedding addition. A lactating cow producing 40 kg (88 lb) milk per day produces 68 kg (150 lb) of total manure per day that is approximately 87% moisture (*ASAE Standards*, 2005). In a compost barn assuming that 80% of the manure, which includes urine, is voided in the compost pack, approximately 59 kg (130 lb) of moisture per cow per day is added to the pack. If a producer adds 15 cm (6 in.) of dry fluffy sawdust with a density of 160 kg/m^3 (10 lb/ft^3) and 9% moisture content wb to 7.4 m^2 (80 ft^2) of a compost pack, the bedding will go from 9% moisture content wb to 61% moisture content wb in seven days, assuming no moisture evaporation from the pack. If 25% of the manure moisture is evaporated it takes 10 days for the new bedding to reach 61% moisture content wb, and 18 days if 50% of the manure moisture is evaporated. Additional

Table2. Compost barn pack characteristics from nine composite samples from seven barns.

	Units	Avg.	Standard Deviation	Low	High
Moisture (wet basis)	%	63.4	5.0	51.5	67.8
Total nitrogen	%	0.99	0.25	0.54	1.37
Phosphorus (P_2O_5)	%	0.36	0.15	0.24	0.75
Potassium (K_2O)	%	0.70	0.18	0.40	1.02
pH	Units	8.45	0.31	7.80	8.85
Carbon nitrogen ratio (C:N)		15.5	2.3	12.2	20.2

research is needed to develop management recommendations to enhance pack bedding effectiveness.

Safety Issue

Fine dry sawdust and wood shavings typically create very dusty conditions when added to the compost barn pack. Airborne sawdust can create a respiratory risk for both the workers and the cows. The workers and cows might also experience eye irritation. Appropriate personal protection is recommended for workers. A fine water spray could be used to reduce airborne dust levels. Excessive moisture addition needs to be avoided. Airborne sawdust can clog air filters on skid loaders or utility tractors used to push fresh dry fine sawdust onto the pack and spread it uniformly. Producers are recommended to check air filters after spreading the fresh bedding. Producers report that dust levels decrease dramatically after a few days as the sawdust is mixed into the pack or cow manure and urine content increases. More research is needed on these potential health risks.

Conclusions

Based on producer information:

- Compost barns are an alternative housing system for milking, dry, and special needs cows that producers have enthusiastically adopted.
- Compost barns can provide very good cow comfort.
- Bedding management is critical to encourage microbial activity, minimize pathogen exposure, and maintain cow cleanliness.
- Fine dry wood shavings or sawdust is the best bedding for the compost barns.
- The compost bedded pack should be sized to provide at least 7.4 m^2/cow (80 ft^2/cow) for 540-kg (1200-lb) cows.
- The compost dairy barn pack must be mixed and aerated two times per day. The pack should be stirred to a depth of 25 to 30 cm (10 to 12 in.) to incorporate oxygen to enhance aerobic decomposition of the manure and urine and to mix manure and urine on the bedding surface into the pack.
- Ventilation is critical to remove heat and moisture from the cows and composting bedded pack. Drying of the bedded surface will retard bacterial growth and keep cows cleaner because dry bedding does not stick as much to teats or leg surfaces.
- Excellent pre-milking cow preparation procedures are required when using a compost dairy barn to remove bacteria from the teat surface. Excellent cow preparation will reduce the number of bacteria that end up in the milk and in the teats when air slips (squeaks and squawks) occur during milking, which can establish a new mastitis infection.
- Compost barns are generally built taller than freestall barns to have the same sidewall opening above the bedded pack for ventilation and aeration equipment.

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