Hoop Houses and Composting - A Good Match?

The PFI research summary for 2001 reported on the composting project that PFI cooperators were carrying out with ISU scientists **Tom Richard** and **Matt Liebman** and graduate student **Terry Loecke**. The research had to do with the bedding-manure mix from swine hoophouses and whether composting that material is a good idea. By 2001, PFI cooperators had carried out 19 replicated trials to show that both composted and uncomposted bedding-manure could benefit crops. And PFI research had also turned up examples of nitrogen tie-up as uncomposted hoophouse bedding-manure decomposed in the soil. See Table 8 for a "breakdown" on the breakdown of bedding and manure in hoops and subsequent composting.

Breakdown of Carbon & Nitrogen in Hoops †

	Total Mass (lb/pig)	N (lb/pig)
Excreted in hoop		15.9
Losses in hoop		8.6 ± 1.3
Remaining in bedded pack at cleanout	265.4 ± 103.2	7.3 ± 1.3
Losses in composting	66.1 ± 76.7	3.1 ± 1.5
Remaining for land application	199.3 ± 33.3	4.2 ± 0.9

† From Dr. Tom Richard, PFI on-farm research.
Adequate bedding reduces nitrogen loss in the hoophouse. But application of undecomposed bedding ties up soil nitrogen, making it temporarily unavailable to crops.

Table 8. A great deal of nitrogen is lost from the hoophouse before composting.

A remaining question about hoophouse manure/bedding was how it should be handled. The material coming out of the hoop is rich in carbon from the bedding, which needs to decompose somewhat before application to the field. That suggests some kind of composting. But swine farmers are busy people, and repeated turning of a compost pile is, well, asking a lot. So five PFI farmers kept detailed records of their time handling fresh and composted hoophouse bedding in order to give us a better understanding of the economics. These cooperators were: **Tom and Irene Frantzen** (Alta Vista), **Wayne and Ruth Fredericks** (Osage), **Vic and Cindy Madsen** (Audubon), **Paul and Karen Mugge** (Sutherland), and **Dan and Lorna Wilson** and **Colin and Carla Wilson** (Paullina).

First of all, none of these cooperators was repeatedly turning compost. They simply piled the hoophouse bedding into a windrow and waited - sometimes for the better part of a year - for the material to decompose. This "passive composting" still managed to reduce the volume of the bedding-manure by 18% - 54%. The less volume, the less labor needed to spread the compost.

The arithmetic goes like this:
(volume reduction %) x (manure haul-apply cost) =?
(compost loading cost) + (turning cost)

Collecting the data was hard work, but so was making sense of it. Manure-handling labor differed from farm to farm, batch to batch. A good skid loader or a larger spreader makes a world of difference, and so does having two people divide up the work. Figure 5 shows that the time needed to clean the hoop, haul the bedding, and pile it in a windrow for composting was only weakly related to the hauling distance. And average times can be affected by a single high or low value. So instead of the average, we used the median value, that is, the value for which half the readings were higher and half were lower.

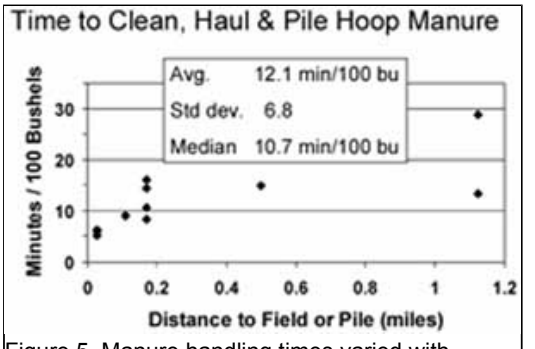

Figure 5. Manure handling times varied with equipment and hauling distance.

Table 9 provides a rough idea of the costs saved from composting 100 bushels of manure, about 5 tons, or one-third of a 300-bu. spreader load. Using the cooperators' average volume reduction of 33 percent, the median hauling distance of 0.4 miles, and the median field length of 0.4 miles, the saving in hauling and application comes to more than four dollars. Balance against that the cost of the additional loading operation of the finished compost, which is around three-and-a-half dollars for the compost that started out as 100 bu. of manure-bedding. So on that basis, passive composting saves more money than it costs. If you also figure in the cost of turning compost, however, the balance quickly turns negative. That explains why most swine producers prefer to let time work for them in reducing the volume of the material that comes from the hoophouse.

Table 9. Composting Costs vs. Savings through Volume Reduction

	VOLUME REDUCTION	X	MANURE HAUL & APPLY	= SAVING		COMPOST LOADING	+	TURNING COST	= TOTAL COST
LABOR	0.33		$1.19	$0.39		$0.49		$0.26	$0.75
MACHINERY			$12.05	$3.98		$2.93		$15.51	$18.44
TOTAL			$13.24	**$4.37**		**$3.42**		$15.76	$19.19