

# Composting Hog Manure - Why Isn't Everyone Doing It?

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## ■ Summary

Composting is a manure management option to consider if you don't have enough land for manure application. You can expect increased cash flow from compost sales only if you are patient and prepared for hard work. A composting option should be evaluated in the context of the entire manure management system on the farm. For liquid manure systems, composting may require liquid-solid separation, which represents an extra step and additional cost. Composting can easily be done with manure from shallow or deep bedded systems. Composting has also been done using liquid manure directly by blending with straw, corn stover or wood waste. This may be a viable option on farms that have manure with higher solids content.

## ■ New Rules May Impact Manure Management Economics

New guidelines and legislation are forcing producers to reconsider their manure management practices. There are now limits to phosphorus loading in some areas – a trend that will increase across North America. Concerns about odor are universal. Concerns with pathogen transmission are increasing in some areas. Environmental concerns with manure management drive the search for economically viable solutions to manure management.

Managing hog manure as a liquid has been the least cost option. If managed properly, a liquid system can be one of the most effective methods for conserving and recycling manure nutrients. However, changes in guidelines and legislation may restrict when and how much manure can be applied to agricultural land. The storage requirement for liquid manure may increase, as

well as the distance to haul this manure to land. This all translates to increased cost.

Composting is one strategy to consider if you have excess manure nutrients for the land base on which you can apply manure. The benefits to composting hog manure include weed seed and pathogen kill, elimination of odor during manure storage and field application, and the creation of a potentially marketable product. It sounds so good that we wonder why all hog farms aren't composting? It's not happening because it doesn't make economic sense for most producers.

## ■ **Composting Has to Make Sense Economically**

The two poorest reasons for composting include the following:

*I can make a lot of money selling compost.*

If your farm does not have a positive cash flow now, don't expect the composting process to increase your cash flow, at least not in the short term. It takes time, it takes patience, and it requires investment to make a quality product. If you are trying to sell your compost, remember that the compost is an input for a compost user, just like feed is an input for a hog producer. A compost buyer has the right to expect quality and consistency in a product.

*I have this gut feeling that this is the right thing to do.*

Composting is a great process, and it's green. There are so many great reasons for composting in terms of long term environmental sustainability, but most of these reasons will not currently affect the hog producer's bottom line. In most cases at this time, it will cost you more to be environmentally sustainable.

Composting should only be done if it reduces the overall cost of managing the manure. It may not make sense on many existing farms unless there is increased environmental legislation. It is certainly an excellent option for siting new hog operations.

Composting is a commitment. You need to be prepared to spend the same kind of energy and time producing quality compost that you spend growing a quality pig. You may have to change some of your hog manure management, which may affect the way that you feed, or even house your pigs. You may have to change your water management. Although this is a paper on composting, it is my opinion that improving your water management is your most sustainable long-term option for reducing manure management costs. It is also very important if you are considering composting.

## ■ Reducing Water in Manure Saves \$\$

The simplest way to reduce manure management cost regardless of the type of manure management system is to reduce the amount of water in the manure. Some farms have been able to reduce the moisture content of the manure from 97-99% to 92-94%. That doesn't sound like a lot, but if you currently produce 1000 gallons of manure with 2% solids, and through management, can increase the solids content to 6%, the total volume of manure decreases to 330 gallons, which is one-third of the volume that you had with manure containing 2% solids.

Increasing the solids content of the manure by using good water management practices is the first and most important step in decreasing manure management costs. This is true regardless of the manure management method chosen, whether it is direct application to land, liquid solid separation, liquid treatment technology, or composting. It is especially true for liquid manure treatment technologies because trying to clean water is a very expensive process.

## ■ Separation of Liquid Manure Before Composting

Separating the liquid from hog manure for the sole purpose of composting the solids may not be viable because of the high cost of separation. Reasons for liquid-solids separation include using the liquids to flush the barn, or because it makes manure application by irrigation to the field much simpler. Composting hog solids is a very simple process and works very well.

There are several examples of composting systems that work with separated hog solids. Elite Stock Farms in Saskatchewan stores their manure as a liquid during the winter, and separates it using a screw press in the spring. They then blend in some additional carbon and compost outside in actively turned windrows during the summer months (Wayne Vermette, personal communication). This is a strategy that is very effective and eliminates the need to compost during the difficult winter months.

Outlook Pork operates a 2000 sow farrow to finish operation and separates and composts their manure year-round. They use wet-dry feeders and produce manure with an average solids concentration of 6%. They find manure application much simpler without the solids in the manure. They found that they were not able to eliminate fecal coliform bacteria in a year-round windrow process. They compost their solids using an agitated bed system and produce a very high quality compost. There is no bulking agent added in this process. The N-P-K analysis of their compost is 4-5-1.

## ■ **Composting Manure from Shallow or Deep Litter Systems**

One of the first farms that composted their manure from a shallow litter system in the early 1990s was Ducan Farms in Abbotsford, BC. The pigs were grouped in pens of 10. Sawdust was added daily. The pigs excreted at the back of the pen, where an automated cleaning system delivered the manure to an agitated bed composting system. They produced a very high quality product, which was sold to greenhouses and as organic fertilizer.

Purelean Farms in Alberta followed a similar model, except that they used larger pens and a Bobcat to move the manure from the barn to the compost facility. They used a similar type of agitated bed composting system, and marketed their product as Hog Heaven.

There are other producers following a similar type of process from either shallow or deep bedded systems. Gelderman Farms Ltd. in Abbotsford uses a shallow litter system where pigs are housed in larger pens containing 85 pigs per pen. Each pen is cleaned weekly using a Bobcat, and delivered to an aerated floor. The manure is turned with the Bobcat several times, and cured before the product is ready for market. The composted product is sold as Go Green, with an N-P-K analysis of 0.88-0.45-1.09 (Jerry Gelderman, personal communication).

## ■ **Composting Liquid Manure without Separation**

Composting liquid manure directly by blending it with a bulking agent is not practical with manure containing 97-99% moisture. It is a very viable option if the water is reduced by improved water management.

There have been several attempts to compost liquid manures by blending them with carbon bulking agents. Global Earth Products in Ontario has developed an agitated bed system that allows liquid manure to be added to straw or wood waste during the composting process. Jeesung Engineering in Korea also markets an agitated bed composting process that also allows additional liquid to be added.

The liquid manure composting process can be manipulated to increase moisture removal through evaporation. Using an enclosed composting system, Richard and Choi (1996) showed that bulking agent requirements could be reduced by a factor of 5 or more during composting of poultry manure, by using the heat of composting to evaporate moisture.

We think that this process has potential. We know from anaerobic digesters that there is significant potential energy in hog manure. By using this potential energy to produce heat, we can use the heat to remove moisture. This results in a concentration of nutrients in the manure, as well as producing a product that is easier to transport and utilize.

### ■ **What are the Benefits to Composting?**

The benefits of composting include reduction in the volume of organic material, weed seed and pathogen kill, elimination of odor with field application, stabilization of nutrients, and a material that is much easier to transport and market. These benefits are not always realized on an individual farm.

The volume reduction as a result of composting applies to manure that has been separated using a liquid solid separator. The composted material can be transported further from the manure storage for the same transportation cost, which reduces the risk of excess nutrient application to the land near the manure storage facility. It also means that the nutrients in the manure are at a higher concentration, which means that the material can be applied at lower rates of application.

Weed seed kill breaks the cycle of weed production that can happen when manure is not composted. With low transportation costs, animal feeds are imported from long distances. Weed seeds are imported along with these feeds. Many weed seeds are not destroyed during the visit to the pig's stomach or during manure storage. Weed seed distribution back to the land increases weed problems, which either reduces crop yield, increases the cost of controlling the weeds by herbicides, or a combination of both. In order for all of the weed seeds to be killed, all of the composting material must reach temperatures above 55 °C for a few days.

Pathogen kill during composting also breaks certain disease cycles, including organisms that cause contamination of water supplies. Fly populations can also be minimized if the material is composted properly. In order to minimize fly populations, the compost should be mixed or turned once per week.

The risk of environmental pollution is reduced with compost application to land because there is no odor to the compost and the BOD (biological oxygen demand) is reduced, resulting in reduced risk of surface water pollution. The concentration of inorganic nitrogen is lower which reduces the risk of surface and groundwater contamination by nitrate.

## ■ **Summary**

If composting is to be done, there are two options. If siting a new operation, it makes sense to consider a shallow litter system, followed by composting the manure. For existing operations, consider the overall manure management and reduce the water content of the manure. Composting of the manure following separation is a good option, however we think that we can develop a system that doesn't require separation. We are continuing to experiment with this process.

## ■ **References**

Richard, T.L. and H.-L. Choi. 1996. Optimizing the composting process for moisture removal: theoretical analysis and experimental results. ASAE Technical Paper No. 964014. ASAE, St. Joseph, MI.