

Business Plan for Horse Manure Composting: Three Approaches



Prepared for the Patriot Resource Conservation & Development Council
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Introduction

Horse owners represent an important component of commercial and recreational livestock in Massachusetts. It has been estimated that there are about 10,000 horse owners with approximately 55,000 horses in Massachusetts. A large number of horse owners have only one or a few horses and often keep them on relatively small lots of one or two acres in areas that have historically been predominantly agricultural. Many horse owners are not well versed in agriculture and nutrient management practices, and the management of their animals has increasingly become a concern to towns and communities as local Boards of Health pay more attention to nuisance odors and water quality impacts associated with having horses. Planning for, and careful attention to manure management, which includes providing alternatives for handling and/or disposal of manure by horse owners, will greatly reduce the non-point source pollution threat and avoid future potential conflicts with neighbors and health officials.

The goal of this business plan is to provide several different models for an economically and environmentally sustainable business that would provide a reliable and cost effective horse manure collection and disposal service to horse owners in semi-rural Massachusetts, with particular reference to the three counties of Essex, Middlesex, and Norfolk counties. With 55,000 horses in Massachusetts, more than 2,230,555 cubic yards of horse manure are produced each year.

How the manure is stored and treated has a substantial impact on its value and/or cost; and the labor, storage and utilization costs for manure management can be considerable. As the number of farms and the amount of open space in Massachusetts dwindle due to development pressures, horse owners are faced with fewer places to which they can take their animals' waste. This means that they end up storing larger amounts of horse manure for longer periods of time. As space gets tighter, storage piles often get closer to wetlands and neighbors' land. Horse owners who are not disposing of or storing the horse manure properly are creating odor and water quality problems that will eventually lead to conflict with their neighbors or with their town's Board of Health, the primary enforcer of animal regulations.

Many horse owners, as well as horse boarding businesses, follow practices which are based on sound principles of caring for their land and not polluting the countryside. Massachusetts has led the nation in its programs to preserve open space and agricultural land, and has numerous community land trusts that preserve land that can be used for horse back riding.

The 2007 Patriot RC&D survey, conducted in partnership with the 4-H Program in Middlesex County, Massachusetts, indicated that 95% of the horse owners surveyed kept their horse for personal use. Ninety-four percent of them said they handle their horse manure appropriately, but only 6% had a fence around their manure pile to prevent access by livestock, wildlife and people. Eighty-five percent of the survey respondents do not cover their manure pile and only half recognize that they might have a problem with pollution from run-off, flies and odor. So there is a need for more education on this topic.

The Patriot RC&D survey also revealed a willingness by horse owners to contract for disposal of their horse manure rather than sell their horses or use riding horses from commercial stables. The solutions to this increasingly evident problem of manure management are complicated by a lack of knowledge by horse owners about such alternatives, and a lack of commercial manure disposal facilities in reasonable proximity to communities with the greatest number of horses.

The business models presented in this preliminary business plan clearly indicate the entrepreneurial opportunities available for horse owners, farmers and independent waste managers in disposal of horse manure. From a simple, clean, small in-vessel system for a single horse farm to an extensive turned-windrow operation using yard waste, the plan outlines solutions that will cost the horse owner less than \$1.50 per horse per day.

Development of new horse manure disposal and composting businesses will expand the availability of compost suitable for horticultural and agricultural uses. The plan's three business models show that by encouraging the start-up of small composting operations and supporting the expansion of the composting industry, there will be an increase in agriculturally related jobs and increased technical knowledge about environmentally sound horse manure disposal systems.

Composting of Horse Manure

Compost is the aerobically decomposed remnants of organic matter and can be used in landscaping, horticulture and agriculture as a soil conditioner and fertilizer. It is a relatively dry end-product that is easily handled and reduces the volume of the manure (40 to 65 percent less volume and weight than raw manure). Composted manure acts as a slow release fertilizer; is an excellent soil conditioner; is useful for erosion control, land/stream reclamation and wetland construction; and is a good landfill cover. Horse manure compost is used by topsoil companies, landscapers, nurseries, and organic farmers.

Three Different Methods Commonly Used for Composting Horse Manure:

1. Turned Windrow Composting

While it is the most common method used for composting large volumes of material, it is also the most land-intensive. Windrow composting is the production of compost by piling organic matter or biodegradable waste, like animal manure and crop residues, in long rows (windrows). This method is suited to managing large volumes of compost. The piles are turned with a loader or special turning machine in order to improve porosity and oxygen content so that temperatures of over 131 degrees Fahrenheit are attained to kill pathogenic organisms and weed seeds in the manure.

2. Aerated Static Piles and Windrows

Static piles can be shaped much like windrows or in an elongated pile or bed. The essential difference is in the name: static piles are not mechanically agitated. Once constructed by conveyor,

loader, or truck, the piles remain in place until the decomposition slows. For faster decomposition, a system of pipes with a blower fan can be used beneath the manure pile to provide oxygen.

3. In-vessel Composting

In-vessel composting is where the aerobic digestion of waste occurs within an enclosed container. In a rotary drum, the composting ingredients are continuously mixed and aerated so that moisture, temperature and odor can be better controlled and optimized. This method produces stable compost much more quickly than open air windrow composting and is recommended for sites that do not have large amounts of land. After a few days to a week in such a vessel, the compost must still be further stabilized in outdoor piles, but the probability of odors, flies, and water pollution have been significantly reduced.



95 cubic yard in-vessel composter

Cost benefit analysis between three different models

It is important to emphasize that proper disposal of horse manure translates into either operational costs for the horse owner to have their manure collected and transported away, or both capital and operating costs for horse owners or other entrepreneurs who develop a manure composting facility. Horse owners who agree to contract for manure disposal will open the opportunity to attract entrepreneurs and farmers who wish to start a horse manure composting business.

There are three separate models that have been developed that can provide a sustainable, economically viable business for handling the composting of horse manure. Table 1 contrasts the different enterprises, all of which receive 8,922 cubic yards of horse manure per year and require a tip fee of at least \$4 a cubic yard to justify the investment in the enterprise. The 8,922 cubic yards of manure was selected using the volume of horse manure identified in Table 1. A hauling schedule was developed that could be maintained on a regular basis by one truck and driver. This would provide the opportunity for an independent operator to develop his or her own business or be a separate enterprise for an existing hauler or composting company.

1. The composting of horse manure, with added livestock manure, is the simplest and easiest to operate and ties very well into the management of livestock waste. The only requirement is to have enough land to accommodate the windrows, curing piles and collection ponds, and be able to allocate the time for turning and managing the process.
2. Composting horse manure, with added yard waste from landscapers and communities, increases the complexity of handling the different ingredients but also allows for increased income from tip fees for the yard waste. The use of yard waste requires that the farm or composting site have an area for storing and unloading of ingredients, and a process for sorting the non-compostable material from the yard waste. This enterprise also needs more land to store the seasonally high supply of yard waste and the longer composting time needed. The finished compost will need to be screened, which adds to the operational expenses.
3. The central site for in-vessel composting of horse manure is capital intensive and relies on tip fees and income from selling compost for its long term viability. The profitability of this enterprise could be increased by selling the compost in bags as the product from the in-vessel composting process is usually of a consistent quality and texture.

For further information, visit the Patriot RC&D Council's website at www.patriotrcd.org. The Council's office is located at 319 Littleton Road, Suite 302, Westford, MA 01886. Phone: 978-692-1904, ext. 108.

Table 1: Comparison between three operations for composting horse manure

	In-vessel operation at a central site	Based on a livestock farm using cow manure	Operation using yard waste
One-time capital investment			
Total area required	No cost allocated: space required is less than 1 acre	\$ 4,000	\$ 12,000
Pad cost - preparing base plus concrete where appropriate	\$ 15,000	\$ 4,342	\$ 14,000
Run-off collection pond or grass buffer strip	\$ 5,000	\$ 8,692	\$ 28,028
Loader	\$ 35,000	\$ 52,500	\$ 52,500
Composting equipment	\$ 213,815		
Total capital cost	\$ 268,815	\$ 69,534	\$ 106,528
Operating Income and Expense			
Annual operating income			
Tipping fees @ \$4 per yard	\$ 35,688	\$ 35,688	\$ 35,689
Compost sales at \$10 per yard wholesale	\$ 44,610	\$ 94,948	\$ 60,100
Total operational income	\$ 80,298	\$ 130,636	\$ 95,789
Annual operating expenses			
Labor	\$ 28,080	\$ 14,040	\$ 20,592
Screen or pre-sale costs			\$ 5,000
Operation and Maintenance costs	\$ 20,000	\$ 24,172	\$ 35,453
Insurance at 2% of gross sales	\$ 1,606	\$ 2,613	\$ 1,915
Office and data management expense	\$ 1,000	\$ 1,000	\$ 1,000
Total annual operating expense	\$ 50,686	\$ 41,825	\$ 63,960
Interest and Principal payments (7 year term @8% interest)	\$ 55,828	\$ 13,005	\$ 19,924
Total annual operating expense	\$ 106,514	\$ 54,830	\$ 83,885
Contribution to overhead and fixed expenses	\$ (26,216)	\$ 75,806	\$ 11,903
Annual cost per cubic yard of horse manure*	\$ 7.93	\$ 2.15	\$ 3.17
Assuming that the volume of horse manure is reduced by 50% and sold as compost for \$10 per cubic yard, the net cost/income per cubic yard of composting horse manure are as follows:	Cost of \$2.90 per cubic yard of manure	Income of \$2.85 per cubic yard of manure	Income of \$1.88 per cubic yard of manure

* Does include income from tip fees to offset cost of the operation, but there is no allowance for any income generated by selling finished compost.