



Manure Management: Fact Sheet 2

GOALS: Become confident in best practices for manure storage and know how to take simple steps to reduce risks to the environment.

Manure and water quality:

Manure is high in nutrients (nitrates/nitrites and phosphorus) and can be an asset to your farm as fertilizer. You can sell manure, use it on your fields, and/or develop nutrient rich compost. Although manure can be beneficial, you need to manage manure properly as it can have negative impacts on humans, animals and water quality if mishandled (see *Fact Sheet 1 Protecting Water* for details).

Determining your on or off farm manure management strategy:

Soil and manure testing can help determine the nutrient needs of your crops and the nutrient content of your pile. If you have a surplus of manure, it can be recycled off-the-farm. There are two options for handling excess manure - export to off-the-farm sites or composting. The New England Ag. Manure Exchange Program provides farmers with an online resource to connect to farmers who are looking for manure. You can find more information online at www.nricd.org/manure/. If you give or sell your manure to another farmer, store it in a covered dump truck, trailer or dumpster before hauling the manure away. If you decide your farm needs the nutrients from your manure, or you would like to develop a manure or compost pile, there are management practices in the following sections that you can follow to reduce water quality risks and increase the benefits to your farm.



It is important to test your soil before applying manure. Photo courtesy of NRCS.

Natural filtration systems:

Soil is a natural filter of chemicals and pollutants. Soil filtration happens when water seeps into the soil and down into the groundwater. Some soil particles and microorganisms in the soil can attract, transform and/or decompose organic nutrients like nitrogen (N) and phosphorus (P) from manure runoff. Enhancing soil filtration can help you reduce manure runoff in an affordable and easy way.

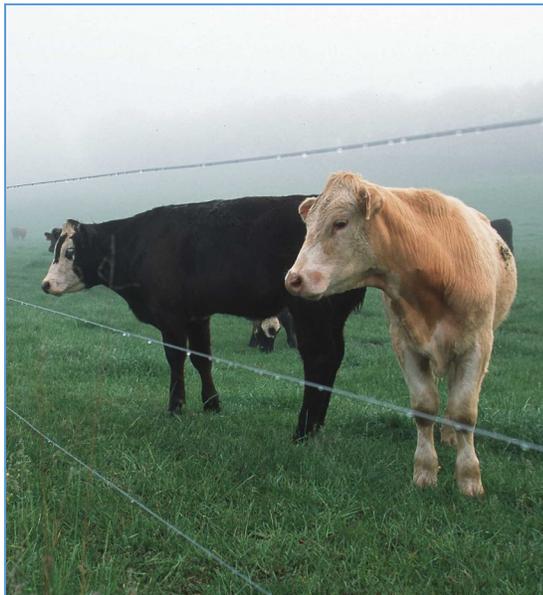
Testing the soils and the depth to groundwater near the manure pile can help you take advantage of natural filtration. **Fact Sheet 4: Self Assessment of Water Resources** will help you determine your soil filtration capacity. An example of a natural filtration system is a vegetative buffer - a permanent area of vegetation installed on a property, typically within or between a farm field, manure pile, or composting area to reduce runoff and soil erosion, support healthy and fertile topsoil, and decrease water quality risks. There are many types of vegetative buffers, including swales (small depressions in the ground that hold runoff water). Planting a vegetative buffer requires little maintenance and can be easy and relatively inexpensive to install.

Developing a manure pile on your property:

Estimating enough space:

Provide enough room for the manure, bedding and feed waste generated by the animals. Different animals produce different amounts of manure. For example, in one year a typical horse would require 648 cubic feet of manure storage space. To determine the size of your manure storage or compost area consider:

- The number of livestock of each species
- Available manure or composting space
- Type and quantity of bedding
- Stocking Rate¹ on the property (refer to *Fact Sheet 3: Pasture and Grazing*)
- Manure handling and collection methods
- Time you plan to store or compost manure
- Consult with your local Conservation District



Courtesy of USDA NRCS.

Placement of manure pile on your property:

By carefully planning the placement of manure storage on your property, you will reduce contamination risks.

- Site the manure pile 100-200 feet from drinking water wells, wetlands, and surface waters
- Avoid piling in areas that commonly flood
- Use flat or moderately flat ground
- Choose a place that is easily accessible
- Consider your neighbors, property boundaries, and prevailing winds when applying manure and apply at least 1,000 ft. away

Developing a vegetative buffer:

When developing a vegetative buffer around a field, manure storage facility and/or composting area:

- Identify the goal of the vegetative buffer (healthy soil, reduced soil erosion, reduction of pollution runoff, etc.)
- Determine the location, slope of the land, size of the area, soil type, height of the water table, and the type of vegetation (often a mix of native trees, shrubs, or flowers) able to thrive in the soil and water conditions in the buffer area. Surround the area(s) of the agricultural fields and/or manure pile with vegetation to slow the rate of soil erosion from runoff and absorb all the excess nutrients and pollutants from the manure.

Stocking rate¹ is the amount of animals (by weight) that can be sustained by an area of pasture. One thousand pounds of live weight represents one animal unit. Stocking rate is the animal unit per grazed acre. To learn how to calculate stocking rate refer to *Fact Sheet 3: Pasture and Grazing*.

Calculating the number of animals that is sustainable for your farm:

You may not have enough land to support your desired number of animals. To determine the amount of animals that can be sustained by your land, calculate the stocking rate for your farm. High stocking rates mean that there are too many animals per grazing land² or grazing acre. Too many animals per acre can increase soil erosion and manure runoff, and thereby the risk of harmful pollutants getting into groundwater and nearby waterbodies. To reduce these risks, farmers with enough land should consider practicing rotational grazing³. Livestock can be rotated between pastures⁴ to provide “resting” time for regenerating vegetation. Refer to *Fact Sheet 3: Pasture and Grazing*.



Grass swale intercepts runoff from surrounding land and diverts around the livestock yard. Photo courtesy of the Livestock and Land Program, CA.

Containment structures:

- Curbs and walls keep manure pile in one area
- Berms/swales (water diversions made using the natural environment) to collect surface runoff from the surrounding land areas and divert it to a safe outlet

Cover your manure pile:

- A roof or plastic lining to prevent rain or snow from eroding manure and sediment away from the pile and into the groundwater and/or nearby streams or ponds
- Roof gutters to direct rainwater away from the manure pile



Left: Geo-textile fabric separating natural soil and 6-8 inches of process sand and gravel (top footing).

Constructing a base for your pile:

Set up a concrete pad or base constructed from geotextile material and gravel to prevent leaching. Geotextiles are fabric or other synthetic materials that are placed between the top layer of the soil and the bottom of the manure pile to create an impermeable surface (a surface that does not allow water to penetrate through it).

- If using a concrete pad, try to slope the base for easy drainage to a vegetative area. Ideally, you will rough up the concrete to create grooves on the floor to reduce slipping and increase the ability for leachate to drain safely to a vegetative area.



Right: Roofed composting system on concrete pad.

Grazing land² on a farm is an area of land available for grazing livestock to feed on during the course of the day.

Rotational Grazing³ is a livestock management practice of moving grazing livestock between pastures and paddocks. Rotational grazing provides time for grazing plants to recover, reduces heavy pasture traffic, increases soil absorption, and decreases runoff. To learn more about rotational grazing refer to *Fact Sheet 3: Pasture and Grazing*.

A **pasture**⁴ is an area of land suitable for grazing livestock. Pastures will have domesticated forage plants, grasses and other vegetation for the animals to consume.

Options for Manure Storage:

	Stockpiling	Dry Stacking	Composting
Description	<p>Stockpiling is a passive way of storing manure. Manure is “stockpiled” or stacked into a pile, where it sits until future use as fertilizer or is moved.</p> <p>When a manure pile sits passively, THE PILE DOES NOT BECOME COMPOST; it remains manure and can still contain pathogens and nutrients that may contaminate the groundwater.</p> 	<p>Dry Stacking is piling manure into a containment area with 3 walls. Ideally, the structure will have a roof and concrete floor.</p> 	<p>Composting is a beneficial way of processing manure so it can be used as fertilizer or sold. Composting is NOT the same as stockpiling or dry stacking manure. Composting manure is an active process that requires monitoring of:</p> <ul style="list-style-type: none"> • Air Flow, typically by turning the pile(s) • Temperature • Moisture levels • Carbon to Nitrogen Ratio (C:N ratio) <p><i>(Refer to the URI Home*A*Syst Composting Livestock Manure https://web.uri.edu/safewater/protecting-water-quality-at-home/animal-waste/small-acreage-livestock/composting-livestock-manure/ for more information)</i></p> 
Initial Cost	Low Cost, Low Time Investment	Moderate Cost, Moderate Time Investment	Moderate to High Cost, Moderate to High Time Investment
Return Value	Low value return for crop production	Medium value return for crop production	High value return for crop production
Environmental Effects	High potential for negative environmental effect	Reduced potential for negative environmental impacts	Reduced potential for negative environmental impacts

Available Resources:

Funding and free technical assistance from the Northern Rhode Island Conservation District (NRICD) and U.S Department of Agriculture, Natural Resource Conservation Services (USDA-NRCS) is available. Below are just a few of the assistance programs available. For detailed information visit nricd.org.

NRICD:

- Assistance with Manure Storage Options
- New England Ag. Manure Exchange Program
- Sizing Manure Storage Units
- Fact sheets and Curriculum

USDA-NRCS:

- Nutrient Management Plans
- Farm Management Plans
- Funding and Technical Assistance with manure planning, storage and management

Resources:

Fact Sheets Series:

- Protecting Water: Fact Sheet 1
- Manure Management: Fact Sheet 2
- Pasture and Grazing: Fact Sheet 3
- Self Assessment of Water Resources: Fact Sheet 4
- Spreading Manure On-farm: Quick Tip

Additional resources, assistance, information and links are available online at www.nricd.org/manure under the “Healthy Farms, Healthy Watershed Program,” or call 401-934-0840.

For more information you can also contact the U.S Department of Agriculture, Natural Resource and Conservation Service (USDA NRCS)

<https://www.nrcs.usda.gov/wps/portal/nrcs/site/ri/home/>

OR

The University of Rhode Island (URI) Home*A*Syst Program

<https://web.uri.edu/safewater/>

These Fact Sheets were updated in partnership with the Northern Rhode Island Conservation District, University of Rhode Island, Providence Water Supply, State of Rhode Island Department of Environmental Management (RI DEM), Farm Fresh Rhode Island, and ESS Group.

The Healthy Farm, Healthy Watershed Project is supported by Southeast New England Program (SNEP) Watershed Grants.

SNEP Watershed Grants are funded by the U.S. Environmental Protection Agency (EPA) through a collaboration with Restore America’s Estuaries (RAE). For more on SNEP Watershed Grants, see www.snepgrants.org.

Takeaways:

- Manure storage structures, enhanced filtration and strategic placement of a manure pile(s) are great manure management strategies that reduce your farm’s water pollution risks.
- There are three main manure storage options which have varying costs and environmental effects (stockpiling, dry stacking, and composting).
- Manure exchange is a great way to remove excess manure.

