

Livestock Yards and Manure Storage Areas on Small Acreages

Protecting Our Drinking Water, Families, and Animals

Fact sheet 2, Small Acreage Livestock and Horse Series, March 2010

Manure, bedding and feed waste that is collected from barns, livestock yards and other areas should be properly stored in a suitable location until it can be safely recycled on gardens and cropland. If there is a lack of land and equipment available for spreading manure on-farm, then it should be taken to other places that can safely recycle it. Manure, bedding and feed waste can also be properly composted on-farm to produce a stable, soil-like product that is free of pathogens and weed seeds. This may also increase desirability for use by others (gardeners, etc.).

Livestock yards are typically used for outdoor feeding, handling, exercise and loafing. They are often referred to as corrals, pens, feedlots, paddocks, etc. They are not to be confused with a properly managed pasture that supplies a valuable source of feed. Livestock yards are usually located near a barn or homestead and are usually relatively small in area compared to the number of animals occupying them. Livestock yards tend to be occupied daily for many hours at a time and are also sources of concentrated animal waste. They are often wet and muddy for much of the year and a potential source of continuous parasite infestation for animals. Livestock yards should be located and managed properly to reduce mud, runoff, pollution and animal health risks.

Proper location of manure storage areas, composting areas, and livestock yards

- Locate at least 100 feet away from a drinking water well or other water resource including ponds, streams, wetlands and storm drains and ditches.
- Locate down hill from a drinking water well and other water resources where possible.
- Consider neighbors, property boundaries and prevailing winds. Leave a buffer.



Roofed composting system on concrete pad.

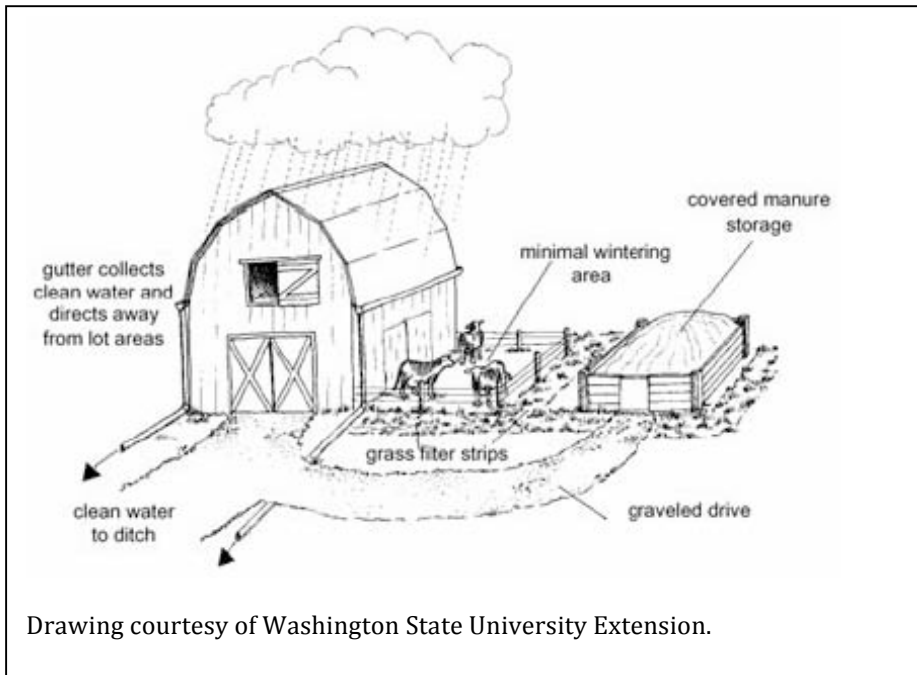
Keep clean water clean

Rain, snow and other runoff from surrounding buildings (roof runoff) and land areas that flow through and mix with manure storage areas, composting areas, and livestock yards can pick up and carry pollutants to nearby water resources. Keeping “clean” water from entering and mixing with these areas reduces mud and pollution risks.

The most common ways to do this:

- Install a roof or other secure covering (plastic tarp or liner).
- Install curbs, walls or other containment measures.
- Install roof gutters on nearby buildings and divert to a safe outlet.
- Install berms and swales (water diversions) to collect surface runoff from surrounding land areas and divert to a safe outlet.

Manure storage and composting areas also generate leachate or liquids that drain from within the piles. Leachate from these areas contains high concentrations of pathogens and nutrients. Lining a manure storage or compost area is very important for protecting groundwater.



Drawing courtesy of Washington State University Extension.

Manure storage and composting areas – basic tips

- Cover and contain manure storage and composting areas. Consider roofing these areas or install a secure covering with a plastic tarp or liner.
- Line these areas with a plastic liner or tarp, organic materials such as leaves or woodchips, or impervious surfaces such as concrete. A sealed concrete floor is recommended in areas with high risk for groundwater pollution.
- Structures made of wood, pre-cast concrete blocks or poured concrete can help with containment (prevent mixing with surrounding runoff) and practical loading and unloading when using a tractor or other equipment.
- For small volumes and/or for efficient off-farm hauling, store manure in covered dump trucks, dump trailers or dumpsters.
- Surround these areas with vegetative buffers to soak up “dirty” water. Keep it from flowing towards a water resource or leaving the property.
- Provide enough storage area for the manure, bedding and feed waste generated for a given time

period. For example, one horse typically generates 2 cubic yards of waste per month. One year of storage would require about 24 cubic yards of storage space or 648 cubic feet (cubic yards X 27). This would require an area 12’ by 12’ (144 sq. ft.) with an accumulation depth of 3-5 feet.

What about composting?

Composting methods can be simple or sophisticated depending on the volume of material, the desired end product and the amount of time, labor and equipment available. Most composting methods will include the use of constructed pads or bins and should contain a roof or other secure covering. Proper composting requires: adequate oxygen and aeration, heating to proper temperatures (130-140 degrees F) for a certain period of time, proper moisture levels (50-60 percent), and the right mix of materials or carbon:nitrogen ratio (25:1 – 30:1).

Compost bin using perforated pipes to increase natural



air flow (passive aeration). Photo courtesy of the University of New Hampshire Cooperative Extension.

On-farm composting publications can be located at the Natural Resource, Agriculture and Engineering Service at www.nraes.org. View our Healthy Landscapes website for additional resources on this topic including laws that may apply.

Diverting clean water to a safe outlet

Divert “clean water” such as roof runoff and other surface runoff to a well-vegetated area that is not prone to erosion or flooding. Roof gutter downspout extensions and/or underground pipes may be needed to divert roof runoff away from livestock yards to a safe outlet.

A safe outlet is one that does not cause erosion and encourages infiltration. Runoff should not travel uncontrolled down a driveway, leave the property or enter a water resource including the vicinity of a drinking water well. Areas of dense vegetation, crushed stone pads, grass swales or underground outlets may be needed to prevent erosion and encourage infiltration.

Handling “dirty” water

It is recommended that runoff from manure storage areas, composting areas and livestock yards be minimized by covering / roofing and containing these areas (see basic tips). Runoff that does mix with and flow away from these areas should be directed to a level or gently sloping area of dense vegetation that can settle and soak up the water. This is sometimes referred to as a vegetated filter strip. For a livestock yard, establishing a dense vegetative buffer around the outer perimeter of the yard may be an option. Depending on the volume of runoff and the extent of the manured area, sediments within the runoff may accumulate in the vegetated filter area. They should be removed periodically to allow for even, steady flow. A settling area, which is usually constructed out of concrete and requires regular cleaning, may be needed to trap sediments before dispersing the runoff to vegetated areas.

At a minimum, runoff should not travel uncontrolled down a driveway, leave the property or enter a water resource including the vicinity of a drinking water well.

Contact the USDA Natural Resources Conservation Service for more information and assistance with runoff management.



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

Livestock yards – basic tips

- Prevent roof runoff and other surface runoff from entering the yard by installing roof gutters and berms and swales (water diversions). This is a big source of mud and pollution risk.
- Consider roofing part or all of the yard, especially outdoor feeding areas, to keep out rain and snow and reduce mud and runoff. This set-up may serve as a combined livestock yard and manure storage area.
- Surround the yard with vegetative buffers to soak up “dirty” water. Keep it from flowing towards a water resource or leaving the property.
- The yard can be lined with concrete or a geo-textile material and gravel to prevent mud and protect animal health.

Concrete pad: when raising cattle, pigs, sheep or goats and the animal concentrations are high, one way to reduce wet, muddy conditions is to install a poured concrete pad surface within the yard. This is common for outside feeding areas, sometimes known as a

feedlot. A concrete curb helps to direct surface runoff to a designated area where a settling basin and vegetated filter strip can be installed to handle the runoff. Installing a corner wall can help with pushing up and stacking manure with a tractor. Scrape the concrete pad at least one time per week and daily is best. Roughing the concrete into grooves during construction can help counteract slipping. Roofing all or part of the concrete pad provides both shelter and water quality protection.

An earthen yard is generally preferred for foot health and animal loafing and is best saved for dry conditions. Where needed, a combination concrete pad and earthen yard can provide flexibility with outside access during various weather conditions.

Geo-textile material and gravel: Geo-textile is a fabric or other synthetic material that is placed between the natural soil layer and a top footing of sand and gravel (or other similar material). The geo-textile prevents the inter-mixing of the top footing with the natural soil while allowing water to drain through the soil. It also improves stability, load bearing capacity and drainage. This option works well for horses and in settings where periodic removal of solid manure can be accomplished in ways that do not remove the top layer of sand and gravel too rapidly or damage the underlying geo-textile. This option requires proper engineering and maintenance including periodic replenishing of the top footing material. View the Ohio State University Fact Sheet *Using Geotextile Fabric in Livestock Operations* at <http://ohioline.osu.edu/aex-fact/0304.html> or contact the USDA Natural Resources Conservation Service for more information. View our website for additional resources on this topic.

Additional tips for managing earthen yards: Refer to our Worksheet 1 *Livestock Yards and Access: Assessing Your Risks* for a minimum recommended area per animal for sizing a livestock yard. This minimum livestock yard area should not be confused with the total land area needed to support one animal unit or 1,000 pounds of live weight (a stocking rate).

- Remove solid manure as frequently and practically as possible.

- Establish more than one livestock yard to rotate between every two to four weeks. This helps reduce mud and excessive manure loading.
- Feed animals in the barn and limit access during wet, muddy conditions. Note that increased confinement to barns and roofed areas will increase the amount of manure to be collected and stored.
- Sand or woodchips can be used to create a mound or “dry spot” for animal loafing. Be sure that you do not create drainage problems, such as low spots where water collects and ponds. Both of these options require regular maintenance including periodic replenishment of materials.

Safe manure recycling – basic tips

It is important to identify whether you have a surplus of manure and nutrients compared to the land available. Soil testing is the primary way to determine if crops and gardens are in need of supplemental nutrients. If a surplus of manure and nutrients exist then it should be recycled off-farm.

Recycling manure off-farm:

- Develop a network of neighbors and gardeners who can use it.
- Locate farms, nurseries and compost facilities that can use it. View our Healthy Landscapes website on this topic for a list of compost facilities.
- Consider composting the manure on-farm. It may increase desirability for others to use.

Recycling manure on-farm:

Apply manure in the right place at the right time and in the right amount to optimize its value and minimize pollution risks. Consider developing a nutrient management plan that takes a comprehensive look at the crops, nutrient sources and applications, soil and manure testing, proximity to nearby water resources, etc. View our Healthy Landscapes website on this topic for additional resources.



- Keep records of the manure, compost and other fertilizers applied - when, where, how much.
- Don't guess, soil test to determine crop nutrient needs.
- Test manure or compost to determine nutrient content. Otherwise, rely on accepted book values.
- For annual crops and gardens, till manure into the soil immediately after spreading to conserve nutrients and reduce nutrient losses. If manure is applied to annual cropland in the fall, consider planting a winter cover crop to control erosion and reduce nutrient losses.
- Manure or compost can also be spread thinly and evenly over grasslands immediately after hay cuttings or mowing. If applying to pasture, it is important to spread the manure about one month before a grazing cycle. Smothering of grasses can occur if the manure is applied too thickly or when the grasses are taller. Parasite eggs in manure may cause an infestation problem on pastures. Maintain a good de-worming program for your animals.
- Avoid spreading manure during winter months and on frozen, snow-covered and muddy ground. Late fall through mid-Spring is a key period where properly managed manure storage areas are needed.
- Do not apply manure or compost when soil tests indicate high phosphorus levels. Supplement with other fertilizers to supply necessary nitrogen and potassium.

Your actions can make a difference
Protecting and improving our water resources and health requires each of us to take action. To become a responsible animal owner and land steward, learn about, plan for and adopt the practices that best suit your farm and protect your drinking water, families, and animals.

For More Information and Assistance
University of Rhode Island Cooperative Extension Home*A*Syst Program, 401-874-5398, or web.uri.edu/safewater

USDA Natural Resources Conservation Service and your local Conservation District, 401-828-1300, www.ri.nrcs.usda.gov for assistance with animal waste management, soil maps, and other programs.

The information in this fact sheet is partially adapted from the following resources:

Bonnie E. Lamb and W. Michael Sullivan. 1993. Horse-Keeping on Small Acreage: Protecting Groundwater and Surface Water. University of Rhode Island College of Resource Development, Department of Natural Resources Science, Cooperative Extension.

Good Neighbor Guide For Horse-Keeping: Manure Management. 1990. University of New Hampshire, Cooperative Extension.

Schmidt, J.L. and B.F. Wolfley. 1992. Protecting Groundwater: Managing Livestock On Small Acreage. Washington State University, Cooperative Extension. Publication Number EB1713.

This fact sheet originated in April 2005 as part of the University of Rhode Island Cooperative Extension (URI CE) Healthy Landscapes Program and is authored by Holly K. Burdett, Research Associate, URI CE Home*A*Syst Program, Department of Natural Resources Science, and Dr. W. Michael Sullivan, Professor of Agronomy, Department of Plant Sciences, College of the Environment and Life Sciences, University of Rhode Island. This fact sheet was revised in March 2010 by Holly K. Burdett.