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Livestock Yards and Manure Storage Areas on Small Acreages

Protecting Water Resources and Health

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Fact sheet 2, Small Acreage
Livestock Series, April 2005

Many small acreage livestock owners live within or close to high density residential areas. Unlike rural properties that are spacious and buffered by woodlands and fields, residential properties usually consist of smaller lots in close proximity to water resources such as ponds, streams, drinking water wells, storm drains and ditches. The amount of land per animal is typically very small, which often creates problems with manure storage, handling and utilization. As rain and snowmelt travel over the land surface and soak down into the groundwater, it can carry pollutants associated with livestock manure and related activities. These pollutants can harm nearby water resources including your own drinking water well or your neighbor's.

What are some solutions?

Some basic components of a sound livestock management program should include:

- Proper manure management – storage, handling and utilization
- Proper livestock yard management
- Proper pasture management
- Alternative watering sources -- limiting direct animal access to water resources (streams, ponds, wetlands, wells, etc.)

This fact sheet, the second in a series of 4, provides specific tips and resources for the proper management of manure and livestock yards. Refer to fact sheet 3 *Livestock Pastures, Fencing, and Watering on Small Acreages: Protecting Water Resources and Health* for specific tips and resources on those topics.

Manure Management

The Goal: Minimize the loss and transport of nutrients, pathogens and sediments from livestock manure to nearby water resources.

The most important factors in achieving this goal include: minimizing the exposure of manure to rain and snow, reducing excessive manure loading to livestock yards and land resources, and safely utilizing the manure on gardens and farmland using sound practices.

Precipitation and runoff that flow through manure piles, compost sites and livestock yards will carry pollutants to nearby water resources. Manure piles and compost sites also generate leachate or liquids that contain high concentrations of nutrients and pathogens as the manure decomposes.

Livestock yards are typically used for animal feeding, handling, exercise and loafing. They are not to be confused with a properly managed pasture that supplies part or all of an animal's forage requirements. They 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 your livestock. They can pose both animal health and water quality risks. Refer to Self-assessment 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).

Manure, bedding and feed waste that is collected from barns and livestock yards should be temporarily stored until it can be safely utilized as a valuable natural fertilizer on gardens and farmland. It is important to

identify whether you have a surplus of manure and nutrients compared to the land available. Start with the general rule of thumb that it takes about one to two acres of land to support one animal unit or 1,000 pounds of live animal weight. Soil testing is the primary way to determine if the land you have available is in need of supplemental nutrients and in what amount. If you have a surplus of manure and nutrients, you will need to arrange for it to be transported to another location that can safely handle and utilize it.

Here are some manure storage and livestock yard management tips:

- Store manure in roofed or covered areas protected from the weather. For small volumes, dumpsters may be an option. Tarpaulins or plastic liners may provide adequate cover if they are weighted down against the wind.
- Roof part or all of a livestock yard to prevent exposure to rain and snow. This set-up may serve as a combined livestock yard and manure storage area.
- Store manure on a poured concrete surface or impermeable liner to prevent concentrated leachate from entering groundwater. This is especially important if: 1) you do not have a covered storage area, 2) the soils on your property are sandy with rapid drainage, or 3) there is a seasonal high water table. Contact the USDA Natural Resources Conservation Service for local soil map information.
- Provide enough storage area for the manure, bedding and feed waste generated. For example, the annual production of manure and bedding from one horse requires about 144 square feet (12' by 12') of confined storage with a manure accumulation depth of 3-5 feet.
- Do not locate manure storage areas and livestock yards within 100 feet of a drinking water well or near surface water resources and storm drains. Be sure to check with all Federal, state and local laws that apply to activities occurring near a surface water or wetland.
- Keep "clean" water from entering the manure storage areas and livestock yards. Divert roof runoff and other surface runoff to a well-vegetated area that is not prone to erosion. Roof gutter downspout extensions, surface or underground pipe, crushed

stone and gentle grassed swales may need to be installed.

- Locate manure storage areas for practical loading and unloading. When using equipment such as a front-end loader tractor, manure storage areas with a corner push-up wall can be useful. Earthen, wooden or pre-cast concrete block walls can also help with containment and diverting "clean" water from entering the manure storage area.
- Direct runoff that travels off of manure storage areas and livestock yards to level or gently sloping, well-vegetated areas such as grasslands and woodlands. The runoff from these areas should not travel towards water resource areas, drinking water wells, driveways, paved areas or flow directly off of the property. A gently sloping grassed swale or plot of grass may need to be installed to capture, settle and filter the runoff as needed. Installing a vegetative buffer of tall, coarse grasses around the outer perimeter of a livestock yard may be another alternative. Grasses could include tall fescue, reed canary grass and perennial ryegrass. If existing pastureland surrounds the livestock yard, consider leaving a buffer area where livestock do not graze as frequently, allowing the grass to grow longer between mowing and grazing events. Depending on the size of the livestock yard and volume of runoff, sediments may accumulate in the grassed areas and need to be removed periodically to allow for even, steady flow. A settling area, which will require regular cleaning, may need to be installed to trap sediments before dispersing the runoff to vegetated areas.
- Avoid locating a manure storage area or livestock yard upslope of a drinking water well, storm drain or water body. If land constraints do not allow for this, it is very important that the manure and livestock yards be covered and contained, reducing or eliminating runoff from these areas.

Additional tips for managing livestock yards:

- Establish more than one livestock yard to rotate between every two to four weeks. This helps alleviate mud and excessive manure loading.

- 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 is useful for pushing up and stacking manure with a front-end loader tractor. Scrape and clean the concrete pad at least one time per week. Roughing the concrete into grooves during construction can help counteract the potential for slipping during wet and frozen conditions. 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. Solid waste accumulations should be removed from earthen yards as frequently as possible. Here are some additional management tips for an earthen yard:

- Limit animal access during wet, muddy conditions. Confine the animals to the barn or roofed areas. This will increase manure collection and storage needs.
- Haul in some sand and gravel 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. Geo-textile fabric can be used in conjunction with sand to enhance earthen livestock yards. This option requires proper engineering and maintenance. 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.
- Periodically spread wood chips to help counteract muddy conditions.

Here are some tips for safe manure utilization:

If you have a surplus of manure and nutrients being generated on your property:

- Develop a network of neighbors and gardeners who need the manure for their gardens.
- Locate farms, nurseries and composting operations that would use the manure. The RI Resource Conservation and Development Council maintains a list of Certified Composting Facilities that will take manure, www.rircd.org.
- Compost the manure, by itself or along with other materials such as leaves and grass clippings to improve its desirability for use by others. Proper composting will destroy the weed seeds in raw manure. Composting methods can be simple or sophisticated depending on the volume of material and the desired end product. Most composting methods will include the use of constructed bins or pads for larger windrows to allow for necessary periodic turning and aerating of the materials. On-farm composting publications can be located at the Natural Resource, Agriculture and Engineering Service at www.nraes.org. Contact RI DEM Division of Agriculture for information on agricultural compost certification.

If you do spread manure on your own land, apply only enough to meet plant nutrient needs. Applying too much of it at the wrong time of year increases pollution risks. It is important to keep records of all manure applications to your land.

- Soil testing will help you determine how much manure to apply and when to apply it. Apply manure to fields and gardens only when a soil test indicates a need. When manure is applied to land on a regular basis, phosphorus levels can build up to a high level in the soil. In this case, manure or compost should not be applied to these areas. Instead, it should be applied to other fields and gardens where a soil test indicates a need for phosphorus. Soil tests can be sent to any land grant university soil testing lab such as the University of Connecticut or University of Massachusetts, as well as a reputable private soil testing lab. When sending the soil test, it is important to fill out the entire order form and note the following information:

1) The type of crop(s) that will have the manure applied. Examples include grass pasture, mixed grass-legume hay field, vegetable garden, corn field, nursery field stock, etc.

2) It is also important to indicate what type of manure you are applying (horse, cow, sheep, etc.) and for how many years you have been doing so—or will this be the first time you are applying the manure to this field or garden. If you have been applying manure, provide an estimate of the rate at which you have been applying it in pounds per 1,000 square feet or tons per acre. Remember, keep records!

- For annual gardens and crops, turn the manure into the soil immediately after spreading to reduce nutrient losses. Manure can also be spread thinly and evenly over grasslands immediately after hay cuttings or mowing. If applying to pastureland, it is important to spread the manure thinly and evenly about one month before grazing.
- 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.

Your actions can make a difference

Protecting and improving the quality of our water resources requires each of us to take action. To become a responsible livestock owner and land steward, learn about, plan for and carry out the steps that best suit your operation while protecting the health of your family, animals and the environment.

For More Information and Assistance

University of Rhode Island Cooperative Extension Home*A*Syst Program, (401) 874-5398, www.uri.edu/ce/wq; for more information on private well protection and residential pollution prevention topics.

USDA Natural Resources Conservation Service (401) 828-1300, www.ri.nrcs.usda.gov; for technical information on livestock manure management, pasture management and renovation, soil erosion and runoff control, and soil maps.

Rhode Island Resource Conservation and Development Council, Inc., (401) 822-8877, www.rircd.org, for a list of Certified Composting Facilities that will take manure.

UConn Soil testing lab, (860) 486-4274
www.canr.uconn.edu/plsci/stlab.htm

UMass Soil testing lab, (413) 545-2311
www.umass.edu/plsoils/soiltest

Natural Resource, Agriculture and Engineering Service, Cooperative Extension, (607) 255-7654, www.nraes.org, for on-farm composting publications.

Rhode Island Department of Environmental Management, Office of Water Resources, (401) 222-3961, www.dem.ri.gov, for information on state laws pertaining to activities within or near a water resource.

Division of Agriculture, (401) 222-2781, for information on agricultural compost certification.

RI Coastal Resources Management Council, (401) 783-3370, www.crmc.ri.gov, for information on state laws pertaining to activities within or near a coastal water resource.

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.*

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