Good Horse Keeping

Best Practices Manual For Protecting The Environment 2011

INTRODUCTION

The purpose of this manual is to provide equine owners/managers with a handbook on installing/managing Best Management Practices (BMPs) to protect the environment. These BMPs are **NOT** intended to be utilized by municipalities and other agencies within Connecticut as a **REGULATORY** standard for conservation practices. It is simply a guide to assist you in the management of your horses to protect the environment.

This manual was developed by the Horse Environmental Awareness Program (HEAP). HEAP is a coalition of federal, state and local agencies, organizations and individuals that meet regularly to discuss and provide educational assistance to equine owners. With the second highest horse density in the nation, proper management of horses has become a great concern with neighbors and regulators in the state of Connecticut; particularly, the impact that proper management may have to waterways and groundwater.

This manual was produced and made possible by the North Central Conservation District; King's Mark Resource Conservation & Development Project, Inc.; Connecticut Council on Soil and Water Conservation; and grants obtained through the USDA Natural Resources Conservation Service and the Connecticut Environmental Review Team. The manual was technically reviewed by George Stang, a retired employee of the USDA Natural Resources Conservation Service. Thanks for the tireless effort of the Connecticut Horse Council; the Natural Resources Conservation Service; the UCONN Department of Animal Science; and other members of the Horse Environmental Awareness Program (HEAP).

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Brown denotes manure management
Blue denotes runoff management
Green denotes pasture management
Red denotes miscellaneous best management practices

Whole Farm Plan

The objectives of a whole farm plan are to provide a healthy, safe environment for both horses and humans, with the least environmental impact. While a whole farm plan sounds overwhelming, it's really not. A little planning now will save time, money and frustration in the future. Taking a look at the "big picture" will help you identify priorities and establish an action plan.

What is Needed for Success:

Assessment - The first step is to assess what you have currently. Whether you have one horse or a large boarding facility, this assessment can help you understand your current situation and help you identify areas where you might need improvement, or where you're currently already doing a good job meeting your goals.

Identification of Issues - Identify those areas which need to be addressed:

- Muddy or eroded areas
- Overgrazed pastures
- Weeds and invasive plants
- Manure storage and/or composting areas
- Flies/pests

Directions:

- **Create a map of your property -** First you need to know the boundaries of your property. Check with the town, deed, etc. It's important that you know where your land begins and ends for proper citing of buildings, fences, and setbacks. Your goal is to have the least impact on the environment and your neighbors while providing a healthy, easy to maintain environment for your horse. The farm map should identify where north is; the prevailing winds; distance to water features such as streams, wetlands, etc.; types of soils; where it is wet, dry, rocky, sandy, and steep; and where there are structures (including structures of your neighbors), fences, and access roads.
- **Aerial Map -** An aerial map may help you determine these boundaries. Check your local Natural Resources Conservation

Service (NRCS) or Farm Service Agency (FSA) office. Other sources include: www.msn.com maps or Google earth.

- **Soil Survey -** Your Whole Farm Plan should also contain a "Web Soil Survey." http://websoilsurvey.nrcs.usda.gov
- **Construct a Plan** - You may utilize the following sources to assist you in constructing your plan:
  - This manual.
  - Sources listed in this manual.
  - Your local USDA Service Center.
  - Your local Cooperative Extension Service office.

Manure Storage Facility

A manure storage structure or area serves as a temporary holding area until materials are removed for utilization on or off the farm. More horses require a larger storage facility. Size of the structure will be determined by the number of horses, bedding types, and the number of days of storage required.

What is Needed for Success:

- *Diversion* - Divert clean water away from your manure using a roof, gutters, curb, wall and/or land grading.
- *Access* – Plan on a location that you can get the manure to year round and you can get equipment in and out of during emptying.
- *Location* – Locate your manure storage as far from property lines and water sources as possible.

What You Need:

- Concrete floor.
- Concrete buck wall – a 3 sided wall at least 4 ft high with footings to hold manure and scrape against during cleanout.
- Supports and/or walls and roof – Allow enough height for equipment use -14 ft minimum is typical.
- Allow enough width for equipment access - 8 ft minimum is typical.
- Gutters/ pipe outlet - to divert clean water.
- Subsurface drainage – if needed, to keep seasonal high groundwater away from the structure.

- Manure – Add in fresh manure daily keeping the average pile height about 6 ft. Empty spring and fall.

Directions:

- Have a professional engineer design the structure to meet appropriate building codes.
- Get necessary permits and approvals.
- Install any necessary erosion control measures.
- Build the designed structure.
- Seed down all disturbed soil.
- Plan to empty the manure at least twice a year or more often as needed.

Roll off Dumpster as an alternative – This practice is especially suited where manure will not be spread on the farm. It is usually a fee for service that includes removal of the manure from the farm to a commercial composting facility. (The service usually provides the container.)

The dumpster site should be well drained and near the barn for convenience. The dumpster should be placed on a concrete pad with curbing to contain spillage. Outside runoff should be diverted.

Smaller facilities may want to opt for a more appropriately sized removal option, such as these bags.

References:

- Horse Environmental Awareness Program ftp://ftp-c.sc.egov.usda.gov/CT/kmrc&d/heap_storage.pdf
- NRCS Waste Storage Facility Standard (Code 313) http://efotg.nrcs.usda.gov/references/public/CT/CT_313_2007_Final.pdf

Covered Manure Storage with Tarp

A covered manure storage structure or area serves as a temporary holding spot until materials are removed. It provides a simple cost-effective storage solution for small numbers of horses. It can reduce surface and groundwater contamination and reduce the presence of flies.

What is Needed for Success:

- Place tarps under pile.
- Fill pile, add manure daily/weekly keeping the average pile height about 4 ft.
- Cover before major rain events to prevent runoff from pile.
- Weight down tarps.
- Uncover to allow for proper cooking and curing.
- Empty 2 times per year (spring and fall) or as needed.
- Haul away; give away; or field spread on suitable soils/areas.
- *Diversion* - Divert clean water away from your manure using a roof, gutters, curb, wall and/or land grading.
- *Access* – Plan on a location that you can get the manure to year round and you can get equipment in and out of during emptying.
- *Location* – Locate your manure storage as far from property lines and water sources as possible.

Items needed:

- 6 tarps (12’ x 16’) –UV light resistant aluminum grommets throughout.
- Assorted weights –i.e. logs, bricks, horseshoes.
- Gutters/ pipe outlet - to divert clean water.
- Subsurface drainage – to keep seasonal high ground water away from the manure pile.

References:

- Horse Environmental Awareness Program ftp://ftp-fc.sc.egov.usda.gov/ CT/kmrc&d/heap_storage.pdf
- NRCS Waste Storage Facility Standard (Code 313) http://efotg.nrcs.usda.gov/references/public/CT/CT_313_2007_Final.pdf

Compost Facility

A compost facility is a place to process horse manure and bedding material into biologically stable organic material. The process kills parasites and weed seeds in horse waste. Finished compost contains plant nutrients in a stable form.

An alternative way to get rid of your horse manure.

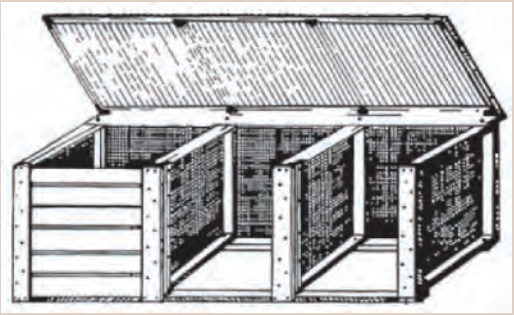
What is Needed for Success:

- *Access* – Plan on a location that you can get the manure to year round, and where you can get equipment in and out of during emptying.
- *Location* – Locate your compost facility as far from property lines and water sources as possible. Some towns may have regulations that require minimum setbacks. Use the same minimum setback distances as used for a *Waste Storage Facility* for planning purposes.
- *Diversion* - Divert clean water away from your compost using a roof, gutters, curb, wall, and/or land grading.
- *Size* - 45 ft. long by 24 ft. wide by 6 ft. deep manure pile; 14 ft. high roof, 3 sided structure. The average horse waste production including bedding is 2 cubic yards/month per horse. For 1 year's storage for 10 horses, you will need 240 cubic yards of storage space. One cubic yard = 27 cubic feet, so you will need 6,480 cubic feet, or an area roughly 45 ft. long by 24 ft. wide by 6 feet deep.
- *Water Source* - Be prepared for the possible occurrence of combustion fires. Locate piles away from buildings and have a convenient water source for such emergencies. The water source may also be needed to maintaining the proper moisture content of the pile.

Directions for Compost Facility Construction:

- Design the structure to meet appropriate building codes. Consider engaging professional services.

- Remember to consider the type and size of equipment that will be used to turn and remove the manure, and make the necessary accommodations in the planning/design process for roof height and door width.
- Get necessary permits and approvals.
- Install any necessary erosion control measures.
- Build the designed structure.
- Seed down all disturbed soil.



For Example: A 45 ft by 24 ft concrete floor is recommended for a 10 horse operation. A concrete buck wall is also advised (*3 sided wall at least 4 ft. high with footings to hold manure and scrape against during cleanout).* Supports and/or walls and roof (*allow enough height for equipment use -- typically 14 ft. minimum)*. Waste concrete block walls between composting bays – to form 4 bays *(allow enough width for equipment access - typically 8 ft. minimum)*.

Water control - Gutters/ pipe outlet to divert clean water. Subsurface drainage to keep seasonal high groundwater away from the structure.

Manure *(add in fresh manure and bedding daily keeping the average pile height about 6 ft in one bay)*

Water *(moisture content should be that of a wrung-out sponge – 60% moisture)*

Directions for Composting:

- Turn pile weekly to the next bay to maintain oxygen levels from May through January. Add soil or finished compost to new manure to add composting organisms to the mix. Composting reduces volume, so combine bays twice per year – once in May and again in November. Don't combine the same manure more than once during the year.
- Internal temperatures should be maintained at 110° F to 140° F by turning and adding moisture, as needed. Use a compost thermometer.

- Water may be added to the pile as needed during turning. The moisture content should be that of a wrung out sponge – about 60%. Roof or other cover keeps out excessive rainfall.
- Finished compost should be allowed to cure for 1 to 3 months.
- Spread finished compost on fields per soil test recommendations or have it removed from the farm.
- Finished compost will not heat up anymore; has an earthy smell, and has a crumbly, soil-like texture.
- *Note: Use of deworming products can slow the composting process.*

References:

- Horse Environmental Awareness Program ftp://ftp-fc.sc.egov.usda.gov/CT/kmrc&d/heap_composting.pdf
- NRCS Compost Facility Standard (Code 317) http://efotg.nrcs.usda.gov/references/public/CT/CT_317_2007_Final.pdf
- On-Farm Composting Handbook. NRAES-54. 1992. R. Rynk, Editor. Natural Resources, Agriculture and Engineering Service, 152 Riley-Robb Hall, Ithaca, NY 14853-5701. (607) 255-7654. Fax (607) 254-8770 www.nraes.org

Bedding

The type of stall bedding used affects not only your horse's well being, your wallet, and your workload. It also impacts the environment. The more waste that you must manage the greater the potential for impacting your neighbor and the surface/ground water.

What is Needed for Success:

Considerations – There are many factors to consider when choosing an appropriate bedding material. These factors include costs, storage, availability, ease of handling, dustiness, absorbency, toxicity, and palatability.

Choices – Among the many choices for bedding are pine shavings, pine sawdust, straw, wood pellets, straw pellets, peat moss, shredded paper and cardboard, and the list grows as we look for absorbent, cost effective bedding. Other materials may be available in different regions such as pine needles, rice hulls, ground corn cobs, kenaf, and many others. Be very cautious about using hardwood sawdust from unknown sources. Even a small amount of black walnut or cherry materials can cause founder.

Rate of Decomposition – Generally, the smaller the size of the product the faster it will decompose. For example, pine sawdust decomposes faster than pine shavings. Due to its higher carbon to nitrogen ratio, wood products break down much slower than the same particle size straw products making them slower to decompose and the nutrients may be released more slowly in your resulting compost. Pelletized bedding has a relatively high rate of decomposition due to the small particle size.

Management Considerations – The use of stall mats greatly reduces the amount of bedding used, as the bedding doesn't mix with the underlying material. If one pays to have manure removed, reducing the volume of material can reduce costs. Potentially a bedding material that costs more, but reduces the volume of materials, may be the economical choice.

References:

- ***Manure Characteristics***. 2000. MidWest Plan Service. MWPS-18 (1). Iowa State University.
- Ames, IA.
- ***Wood Pellet Bedding for Equines Demonstration*** Donna Lamb, Piscataquis County Extension Educator and Richard Kersbergen Waldo County Extension Educator UMaine Extension Office
- ***Horse Manure Management: Bedding Use***, Michael Westendorf, Ph.D., Rutgers Cook College

Nutrient Management

A nutrient management plan is used to manage the amounts, sources, placement, form, and timing of the application of nutrients and soil amendments for plant production while minimizing the risk of water pollution.

What is Needed for Success:

Timing - Nutrients should not be applied during periods when flooding, frozen, snow-covered, or saturated soil conditions can reasonably be expected (typically November through March), or when the potential for surface runoff, soil compaction, and/or creation of ruts is high, or when weather forecasts indicate these conditions are likely. Wastes on pastures and hay land should be applied soon after cutting or grazing and before significant re-growth has occurred.

Permits - All Federal, state, and local laws, rules, and regulations, including local inland wetland agency regulations, should be followed.

Assessment - Document the manure storage and handling system including animal count and average weight and length of confinement for each production phase. Annual manure and wastewater production (volumes); amount of manure nutrients available to pastures/hay land for spreading, and acres needed to apply this manure at Total N and P2O5 based rates.

Soil Tests - Soil test your pastures to determine the need for fertilizer and lime, and follow the recommendations provided. If your pasture is new or has not received lime and fertilizer for many years, you may wish to test for 2-3 years in a row to establish a healthy fertility level. After that, a test every 3 years is sufficient.

Erosion Control – Nutrients can leave the farm when attached to soil particles. Good erosion control is part of the nutrient management plan. Include field specific soil loss estimates. Establish buffers between fields and environmentally sensitive areas, such as, wetlands, watercourses, wells, gullies, ditches, surface inlets, concentrated flow paths, or areas with rapidly permeable soils or aquifer protection areas.

Directions – You may consult your local USDA Service Center or County Extension office for technical assistance in developing your nutrient management plan.

Items needed:

- Items needed for an assessment include a map of the farm; soils information; knowledge of environmentally sensitive areas and manure structures.
- NRCS soil loss equation results.

References:

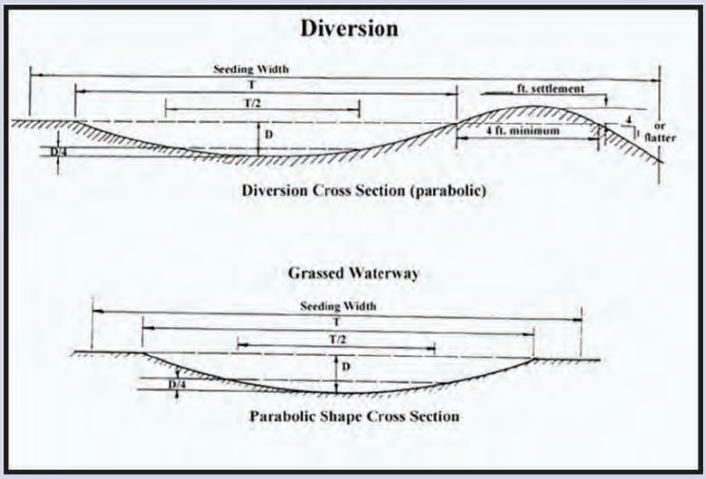
- NRCS Practice Standard Connecticut Nutrient Management (Ac.) Code 590 http://efotg.nrcs.usda.gov/references/public/CT/CT_590_2005-Final.pdf
- ***NRCS National Planning Procedures Handbook*** (NPPH), CNMP Technical Guidance Document www.mn.nrcs.usda.gov/technical/ecs/nutrient/nutrient.html
- ***NRCS Agricultural Waste Management Field Handbook***, Chapter 4 – Agricultural Waste Characteristics
- ***NRCS Nutrient Management Technical Resources***, www.nrcs.usda.gov/technical/nutrient.html
- Statement of Work Nutrient Management (590) Minnesota October 2004 Page 1 of 2 www.mn.nrcs.usda.gov/technical/ecs/nutrient/thirdparty/SOW/Nutrient%20Management-590%20SOW%20MN.pdf
- Wisconsin Conservation Planning Technical Note WI-1 Companion Document to NRCS FOTG Standard 590, Nutrient Management September 2007 ftp://ftp-fc.sc.egov.usda.gov/WI/technotes/cptn1.pdf
- NRCS Minnesota Form MN-ECS-15, dtd. 1/04, Nutrient Management Plan Quick Checklist and Required NRCS Nutrient Management Plan Documentation www.mn.nrcs.usda.gov/technical/ecs/nutrient/nutrient.html
- ***NRCS General Manual*** Title 450, Part 401.03 (Technical Guides, Policy and Responsibilities) and Title 190, Part 402 (Ecological Sciences, Nutrient Management, Policy) www.mn.nrcs.usda.gov/technical/ecs/nutrient/nutrient.html

Diversion

An earthen channel constructed across the slope, generally with a supporting ridge on the lower side, that intercepts runoff from a specific area to a stable outlet. They can be used to prevent clean water from mixing with dirty water from paddocks and manure storage areas.

What is Needed for Success:

- *Access* – Plan on a location that allows for proper operation and maintenance. Sediment removal and mowing will need to occur for proper operation.
- *Location* – Locate your diversion away from other structures or practices. Install to divert water away from farmsteads, barnyards, agricultural waste systems. This practice may be used in combination with other BMP's.



- *Outlet* - A safe and stable outlet for diverted water, proper topography, and suitable soil type. A safe and stable outlet can be a vegetated channel, storm drain, etc.

Materials needed:

- Lime, fertilizer, hay/straw mulch.
- Seed to re-vegetate all disturbed areas.
- If needed, install stabilization materials such as erosion control mats; rock riprap; or cellular blocks.

- Fill material if needed.
- Fence to keep animals from grazing, and/or vehicle access.

Directions for Diversion Construction:

- The amount of water you are diverting will determine the size of the diversion; and the amount of professional assistance you will need.
- Have an engineer/conservationist design the diversion to adequately convey runoff to a safe outlet.
- Get all necessary permits and approvals.
- Install any necessary erosion control measures.
- Build the designed diversion to intercept water. Build a grass waterway to convey water to a stable outlet if needed. Refer to diagram provided.
- Seed and re-vegetate all disturbed areas per the seeding recommendations.

Roof Gutters

With an average rainfall of 45-50 inches a year, roof gutters are a simple and effective method to divert water away from manure covered ground. Roof gutters are a system of open and closed piping that intercepts and diverts water away from buildings and high-use areas. Proper installation will aid in reducing mud, minimizing polluted run-off, preventing disease and injury, and protect building foundations.

What is Needed for Success:

Gutters – Adequately design roof gutters and downspouts based on roof size and storm frequency.

Conveyance – Utilize outlet pipes; underground pipes; splash guards; and downspouts to send water away.

Safe & Stable Outlets - Vegetated filters may be needed at outlet areas.

Directions:

- Install gutters and downspouts to your roof using do-it-yourself gutters, or contracting with a local installer.
- Consider installing rain barrels to harvest rain water. Roof water should only be used for non-potable purposes.

- Provide adequate downspouts with downspout protectors, where needed.
- If needed, install underground outlet pipes to divert roof water away from paddocks, buildings, and manure storage structures. Ensure the outlet is directed to a stabilized area that will allow for water infiltration.
- Backfill any underground trench outlets with soil.
- Seed and mulch all disturbed areas.
- Use stone or vegetation to protect soil from eroding at outlets.
- Avoid discharging outlets near wells or into structures that discharge directly into surface waters.
- Outlets can be discharged to rain gardens to promote filtering and infiltration.
- Use other pervious landscaped areas to allow for infiltration of the rainwater.

References:

- USDA/NRCS Roof Runoff Structure Standard 558

Stream Crossings

Stream crossings are designated controlled areas to provide a stable crossing for animals or equipment that minimizes impacts to stream banks and streambeds. Examples are bridges, culverts, and stabilized gravel pads. They can prevent sediment erosion and nutrient loading of the stream.

What is Needed for Success:

Location – They should be located where the stream banks are stable and preferably flat and high above the water.

Culverts – Culverts must be properly sized and installed to handle the quantity of water.

Bridges – Bridges are better for larger streams and have fewer impacts to aquatic life than other structures.

Directions:

- Prior to construction obtain all necessary federal, state or local permits.
- Design safe and effective stream-crossings to encourage horses to cross streams at designated crossings only.
- Fence stream bank to discourage streamside crossing at non-designated areas.
- Provide alternative watering devices (pasture pumps, watering troughs) to discourage streamside watering. If streamside watering is an only option, protect a designated area with stones to minimize erosion.

References:

- USDA/NRCS Stream Crossing Standard 578

Vegetated Buffers

Naturally vegetated or planted buffers along streams, ponds, steep slopes or other areas of concern are generally not grazed. Vegetated buffers are an effective tool for filtering nutrients, pathogens and sediments from storm water runoff, protecting sensitive resources, and may provide wildlife habitat.

What is Needed for Success:

Buffer Width - The width of the buffer will depend on the resource being protected, steepness of slope, and amount of potential pollutants entering the area. Appropriate vegetated buffers may range from 35-100+ feet in width. Larger distances are recommended from manure storage or sacrifice areas.

Materials - Depending on the type of buffer, materials needed may include: soil test results; fertilizer, lime, grass seed, shrubs, and saplings.

Directions:

- **Natural Buffer**
  - Maintain the existing vegetation. Simply stop mowing the area and plants will have a chance to re-establish themselves. It will probably take several years for trees and woody shrubs to become fully established.
  - Identify invasive species that are growing. They may need to be removed and replaced with non-invasive plants species.
- **Landscaped Buffer**
  - Prepare the area by having the soil tested to reduce or eliminate the need for using lime or fertilizer.
  - Buffers that contain a mix for trees, shrubs, and ground covers are more effective than buffers containing one plant type.

- Plant native species. Most native vegetation requires little or no fertilizer and provides wildlife habitat.
- Choose non-invasive shrubs and saplings which help to increase the uptake of nutrients. Grasses should be dense stiff species which will trap sediment.

References:

- ***Vegetated Buffer Strips****: Slow the Flow to Protect Water Quality* – Mass DEP www.mass.gov/dep/water/resources/buffers.doc
- ***A Conservation*** *Catalog: Practices for the Conservation of Pennsylvania's Natural Resources:* – NRCS, PA – www.pa.nrcs.usda.gov/news/FTPPublications/conscatalog.pdf
- ***Invasive Plants:*** www.hort.uconn.edu/CIPWG

Soil Testing

This is one of the easiest and most important BMPs for hayland and pasture management.

What is Needed for Success:

Items Needed – Soil test kit and collection materials.

Location - Areas differing in appearance, slope, drainage, treatment, or intended plant usage should be sampled and tested separately. Examples include:

- Areas recently limed or fertilized should be sampled separately from portions that have not.
- Upslope, dry part areas, and wet areas should be sampled separately.
- Where poor growth exists, take samples from both good and bad areas, if possible, and submit separately.

Directions:

- Using an auger, soil tube, or spade – take uniform cores of three to four inches throughout each designated area that you are sampling.
- Put the slices, or cores, of soil in a clean container and thoroughly mix them. Transfer **at least one cup** of the soil mixture to a plastic bag or re-sealable container.
- If sending more than one sample, also label the outside of the bag or container. (If samples are excessively wet, dry them **at room temperature** first. Do not dry samples on stove or radiator.)

References:

- www.soiltest.uconn.edu

Pasture Rotation

Pasture rotation involves dividing one larger pasture into smaller grazing areas, allowing the smaller pastures to recover in between use. This ensures that overgrazing does not occur and provides more nutritious, higher quality feed for the horse. Additionally it prevents areas from becoming compacted, and reduces erosion by maintaining adequate forage cover.

What is Needed for Success:

Site Considerations – Long and narrow or odd shaped pastures are not grazed evenly. Keep pastures as square as possible. As a guide, it takes about one acre of good quality pasture to maintain one horse on pasture for the entire growing season.

Directions:

Rotate and Rest Pastures - Recovery time for grasses ranges from 10-60 days, depending on the season; the weather, and soil characteristics. Generally expect to wait 14 days for grasses to grow to grazing height in the spring, and 30+ days in the summer. Avoid keeping the horses more than 7 days on any one paddock. With temporary fencing, divide your total pasture area into a minimum of 5 paddocks and rotate animals to a new paddock at least once a week. This system will allow each paddock to rest for 28 days. A rule of thumb is to graze animals when grass is 8-10" high and rest grass when it is 3-4" high.

General Maintenance – Keep grasses in the *vegetative* state with a combination of grazing and mowing. Soil test your pastures to determine the need for fertilizer and lime, and follow the recommendations provided. Remember, if your soil pH is too low (acidic), any fertilizer you apply may not be accessible to the grass

plants. Drag or chain harrow pastures as needed to break up and spread manure piles. Mow weeds before they form a seed head.

Utilizing a Sacrifice Area – Use a sacrifice area to rest pastures that are recovering from grazing or when you must limit the grazing time each day. Avoid putting horses on wet pastures to protect vegetation and minimize compaction.

Pasture Renovation – If you currently have nothing but weeds and bare soil, you probably should reseed your pasture. If you have grass present, in most cases you can revive it to a healthier state by applying the management tips noted about, i.e., rotation, rest, mowing, pH, and fertility. You are going to have to utilize these practices even if you go ahead and reseed the pasture, so you may want to try them first and evaluate the results. A soil test is recommended.

Species Choice – No one plant species is ideal for every horse pasture. Legumes may reduce the need for nitrogen fertilization – and they are nutritious. They include clovers, alfalfa, and birdsfoot trefoil. Alfalfa will not tolerate close grazing. Grasses include Kentucky bluegrass, orchard grass, brome grass, perennial ryegrass, tall fescue, and timothy. Bluegrass and orchard grass are commonly used for horse pasture. Bluegrass tolerates close grazing, while orchard grass has a higher yield potential. If using fescues, make sure to use an endophyte free variety, so as not to cause reproductive problems in mares. Wait until the blade breaks off in your fingers and the plants stay firmly rooted before turning animals onto a new pasture. Never turn horses out into a new pasture when the ground is wet or you will risk extensive damage in the form of uprooting, soil compaction, and torn up sod.

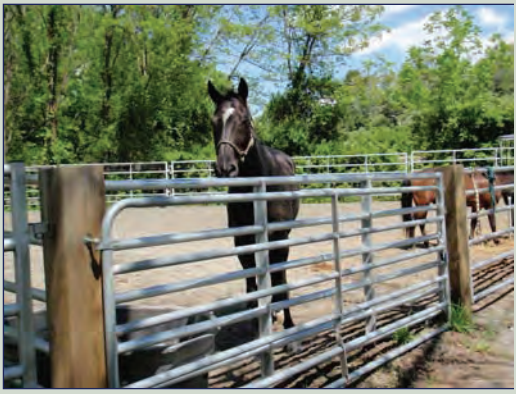
Seeding Methods – From an environmental standpoint, planting seed with a no-till planter is the best way to go - especially if you are dealing with a hillside pasture. This eliminates the need to plow up the soil, and reduces the risk of erosion. Ideally, the existing plants are sprayed with herbicides to kill them, or they may be grazed and/or mowed as close to the ground as possible in the fall and planted in the spring. Conventional plowing and planting includes one pass with a plow or

harrow, and one or more passes with a harrow and rake to prepare the all-important seed bed. Conventional plowing is used when the field is appreciably rougher than desired; when soils are very compacted, or when weed populations may be better dealt with mechanically than chemically.

References:

- USDA/NRCS Hayland & Pastureland Management Standard 512

Sacrifice Area



A sacrifice area is also known as an exercise paddock, turnout area, dry lot, heavy use or all-weather paddock. They are areas necessary to allow resting of grazed and/or wet pastures. It is an integral part of a rotational grazing system that provides a safe, clean, dry exercise area and protects soil and water resources by reducing mud, ice, soil erosion and sedimentation. A sacrifice area can also double as a small riding or training area.

What is Needed for Success:

Location - For chore efficiency, access to shelter and manure management should be considered. The distance to water bodies and water sources should be maximized to prevent potential pollution. *(see "manure management" sections for recommended setbacks*). It is best located in a relatively flat area (2-4% slope) with well-drained soils to minimize erosion of the pad. Do not locate in areas subject to regular flooding.

Size – As a general rule, the minimum size would be 400-600 sq. ft. per horse. However, size is dependent on several factors including time spent in area, size of horse, exercise needs, facility layout, soils, and compatibility of more than one horse. Generally, the longer the time spent in the

sacrifice area, the larger it should be; however, large areas of open soil are subject to additional runoff and reduce grazing pasture areas.

Maintenance - Collect manure from the area daily as well as any feed not consumed. Water source should be located away from shelter to encourage movement and minimize erosion in one area. Divert all surface water runoff from outside sources. This includes roofs, roads, and nearby pastures. Water buckets and tubs should not be overflowing causing muddy conditions. Maintain a vegetated buffer around the area to filter any runoff *(see Vegetated Buffer).*

Directions:

- In most cases, the existing surface material should be removed until a stable base is reached, approximately 6-8 inches in depth.
- Place a geotextile fabric on the base to prevent mixing of materials.
- Layer crushed stone, 1 to 1 ½ inches in diameter, approximately 6 inches thick over the fabric.
- Add and compact stone dust or processed gravel at least 3" thick. This will make the area easier to clean.
- Surfacing materials – Consult with Cooperative Extension, your veterinarian, or your farrier regarding possible hoof problems from certain surfacing materials. Some commonly used surfacing materials include stone dust, woodchips, or sand. Wood chips will require more maintenance for removal and replenishment, but may offer a cost-effective surface alternative.
- Since even the best maintained areas will have some runoff, make sure down slope areas are vegetated to slow and renovate any potential runoff.
- Install fencing and gates as desired.

References:

- ***Using Geotextile Fabric in Livestock Operations:*** http://ohioline.osu.edu/aex-fact/0304.html
- ***Sacrifice areas:*** http://www.extension.org/pages/Exercise_or_Sacrifice_Lots_for_Horses

Fencing

Fencing can include and exclude, depending on your needs. Fencing helps you manage grazing; establish a sacrifice area; and excludes horses from sensitive areas to protect from pollution or overgrazing.

What is Needed for Success:

- *Considerations* - Safety, strength, visibility, maintenance, terrain, height, availability, cost, purpose, difficulty of installation, aesthetics, horse temperament, and compatibility should be considered when choosing fencing.
- *Construction* - It is important to use proper posts and brace them according to manufacturer's recommendations. Post depth and spacing are also important and will depend on the type of post utilized.
- *Selection* - Types include high tensile, diamond mesh, board and rail, split rail, PVC pipe, electric wire/tape. Barbed wire fence should never be used for horses due to the possibility of injury.
- *Maintenance* - All fencing, regardless of type, should be free of sharp edges, protruding wire, etc.
- *Vigilance* - Walking the perimeter on a frequent basis can ensure that your fence is maintained safely and securely, especially after storm events.

Directions for Fencing Construction:

- In general, the more horses and the smaller the area, the stronger the fence needed. Fencing for small paddocks, particularly for foals and stallions, must be sturdy.

- A square layout requires less fencing than a rectangle of the same area. For example, a 20 by 20 square (400 sq. ft.) equals 80 ft. of fence vs. 10 by 40 rectangle (400 sq. ft. area) which equals 100 feet of fence.
- Gates should be placed in high and dry areas. Avoid low, wet areas which will turn into mud holes. If it is absolutely necessary to use a wetter area, make a mini sacrifice area with geotextile and stone dust *(see Sacrifice Area)*.
- The height will be determined by the type, size and athletic ability of your horses. The minimum recommended height for perimeter fencing is 5 ft with electric fence at horse chest height. Fences that divide pastures may be slightly lower. However, if one wants to prevent horses in adjacent paddocks from fighting and leaning over the fence, making fences 6 ft would be appropriate. These heights should be adjusted for miniatures, ponies and drafts!
- Woven wire fence should have a board across the top to prevent horses from bending the wire down and also to prevent head and neck cuts.
- Cribbing of a board fence can be prevented by using a strategically placed electric wire along the inside edge of the fence.
- Styles vary by regions and mixed styles may be appropriate at the same facility.
- Some towns regulate the types and locations of fencing. Check with local officials before erecting new fencing.
- The property owner is responsible for containing their animals and any potential damages that may be incurred. Check Connecticut Statute TITLE 47. LAND AND LAND TITLES, CHAPTER 823. FENCES.
- When using fencing for buffers, generally the wider the buffer the greater the benefit for stream protection and wildlife enhancement. The potential for flooding should be determined so as to determine the most appropriate fence, as woven wire can trap debris. Electric fence may need line switches *(see Vegetated Buffers)*.

References:

- Fences for Horses, University of Georgia, Cooperative Extension
- Fencing for Horses, Penn State College of Agricultural Sciences and Agricultural Research and Cooperative Extension

Watering Facilities

Horses must have access to plenty of clean, fresh water to be healthy. A mature horse will require between 10-12 gallons of water per day, depending on weather and exercise. Allowing horses direct access to ponds and streams may result in stream bank erosion, water pollution, and poor water quality. The use of alternative watering systems can prevent this from occurring. No matter what type of watering system is utilized the following guidelines will minimize the impacts.

What is Needed for Success:

Location – Whenever possible, locate water systems in a conveniently accessible, high and dry area. Locating watering systems away from pasture gates will prevent loafing and help distribute manure and urine.

Maintenance – If using tubs and/or buckets, they should be cleaned on a regular basis to prevent mosquito breeding. Automatic watering systems constantly freshen the water supply, which reduces water waste and keeps the water palatable; but they do require maintenance and daily checks to ensure they are working properly.

Minimize Erosion – A mini sacrifice area can be created around the watering area to prevent muddy areas and minimize erosion.

Directions:

- *Automatic Watering System*
  - Place watering mechanisms near fence line.
  - Run waterlines underground to stable.
  - Connect to electrical source.
  - Check watering mechanisms periodically to be sure they are clean and functioning properly.
  - To reduce energy costs in winter, consider a solar powered watering tank.
  - Consider using a float valve for tank watering systems, which keeps a constant supply of fresh water available.
- *Manual Watering System*
  - Place tub near fence line away from wet areas.
  - Tub should be inspected and cleaned periodically and contain fresh clean water at all times.
  - Tub should be emptied often to discourage mosquito breeding.

Insect Control

Insects are not only a nuisance, but also may spread disease in horses and humans. The implementation of an Integrated Pest Management program that includes general farm sanitation; prudent use of insecticides; physical barriers; and biological control are important to reduce insect populations.

What is Needed for Success:

General Farm Sanitation – Incorporating the BMPs discussed in this manual will help reduce insect populations.

Biological Control – Biological controls such as fly predators and feed through preventions may be used. Encourage bat roosting by building bat houses near your property.
Prudent use of Insecticides – Use insecticides when practical such as when riding or handling horses.

Use of Physical Barriers – Use fly sheets, face mask, and ear nets to prevent irritation to horses. Ticks don't like to cross paths lined with woodchips or gravel.

Reduce Habitat – Insects thrive in moist woods and tall grasses. Keep pastures mowed. Clean up brush piles and leaf litter (put the leaves in your compost pile!). Bright, sunny areas are less likely to harbor insects. Trim overhanging branches.

Reduce Carriers – Keep your facilities free of rodents. Rodents help move insects from one host to the next. Keep grains secure in metal garbage cans and clean up spills. Discourage deer; and obtain chickens or guinea hens who love to eat insects.

Directions:

- **Fly Control**
  - Remove manure from stalls and paddocks daily (minimizing wet areas will help discourage fly breeding).

- Fly predators – a biologically safe, long-term method of controlling flies works by blocking the reproductive cycle of flies. These tiny, nocturnal, stingless wasps lay eggs in the fly pupae and use it as a food source killing it before a fly can develop.
- Chemical controls such as insecticides, fogs, mists, baits, and topical spray repellents are available. However, flies can become resistant to them. They can also harm horses, humans, and the environment.
- Fans can inhibit the movement of those flies that are not good fliers. Proper installation of fans to prevent injury to horses and humans is essential.

- **Mosquito Control**
  - Remove standing water. Keep water containers to a minimum and dump out, put away, or drill drainage holes in those not related to taking care of horses (including potted plants). Dump, clean, and refill water troughs at least every 3 days. Goldfish in troughs may help consume larvae. Drain puddles that persist and fill them in.
  - Stable horses during dusk/dawn (peak biting times). Consider using premise and automatic spray systems that often use pyrethroid based sprays. These can be small and portable to extensive tank-based systems.
  - Physically prevent mosquitoes from biting horses by using fly sheets, face masks, ear nets, and leg wraps (be careful in hot weather and prevent entanglement).
  - Use fly sprays that have synthetically developed pyrethroids components that are effective, have low toxicity to mammals, and are often longer lasting than pyrethins, derived from chrysanthemum plants that are very effective for a short time.

- **Tick Control**
  - Groom your horse thoroughly daily, using the curry comb in a circular motion to loosen up dirt and scurf on the body, not the legs. Use the dandy brush to brush off this dirt and brush off dirt and mud on the horse's legs.
  - Follow up with the soft brush and while grooming across the horses entire body, follow the direction of the hair, carefully check for ticks.
  - If you see a 1 inch welt on the body, a deer tick has probably bitten your horse but since dropped off.
  - Use a permethrin repellent for tick control. It is sold under many brand names.
  - If you find a tick, remove it immediately.
  - Do not crush or twist, apply baby oil or petroleum, or use a lit match to get it out. This could cause the tick to send blood back into you horse, increasing the chance of infection or disease transmission. It could also result in the head of the tick detaching from the body and remaining beneath the skin.
  - To remove the tick, use a pair of tweezers and grab the tick firmly by the head where it enters the skin. Pull the tick firmly in a direct line from the skin. Place the tick in a small jar of rubbing alcohol. Wash the place where the tick was attached with a mild antiseptic. Wash your hands. Mark the jar with your name, address, phone number, date collected, host collected from (horse), recent travel history, and submit to the Connecticut Veterinary Medical Diagnostic Lab (www.canr.uconn.edu/patho/) for identification.

References:

- Spalding Laboratories, 760 Printz Road, Arroyo Grande, CA 93420. 1-=888-562-5221, www.spalding-labs.com (fly predators)
- *Horsekeeping on a Small Acreage: Facilities Design and Management*, by Cherry Hill. Illustrated by Richard Klimesh. 1990.

Bat Houses

Bat houses are "summer" residences for these nocturnal mammals that hibernate in the winter. The two most common species of bats in Connecticut are the little brown and the big brown bat. They are insectivores with healthy appetites for mosquitoes and other night-time insects, including many agricultural pests. Bats can consume between 600-1000 insects per hour. By encouraging bats, one can reduce the amount of insecticides needed.

What is Needed for Success:

Location - Proper construction and placement of bat houses are essential for use by a bat colony. Bats prefer to be located within ¼ mile of water, with diverse habitat such as open and wooded areas.

Presence of Bats - The presence of bats in the area, which can be determined by evening sightings or bat droppings, increases the likelihood of bat house use.

Sun Exposure - Full, all-day sun is often successful in all but the hottest climates. To create favorable conditions for maternity colonies in summer, internal bat house temperatures should stay between 80 and 100 Fahrenheit, as long as possible.

Protection from Predators - Houses mounted on sides of buildings or on metal poles provide the best protection from predators. Metal predator guards may be helpful, especially on wooden poles. Bat houses may be found more quickly if located along forest or water edges where bats tend to fly. However, they should be placed at least 20-25' from the nearest tree branches, wires, or other potential perches due to aerial predators.

Avoiding Uninvited Guests - Wasps can be a problem before bats fully occupy a house. Use of ¾" roosting spaces reduces wasp use. If nests accumulate, they should be removed by early spring before either wasps or bats return. Open-bottom houses greatly reduce problems with birds, mice, squirrels, or parasites.

Timing - Bat houses can be installed any time of the year, but are more likely to be used during their first summer if installed before bats return in the spring. When using bat houses in conjunction with excluding a colony from a building, install the bat houses at least 2-6 weeks before the actual eviction, if possible.

Directions:

To build a bat house you need the following materials:

- Rough cut lumber or exterior grade plywood (1/2 thick minimum).
- ¾" thick furring strips
- 1/8" mesh netting (HDPE plastic)
- Screws, hardware, or staples (must be exterior grade – galvanized, coated, stainless steel)
- Caulking (suitable for aquarium or kitchen use)
- Dark exterior grade, water-based paint or stain
- Tar paper or shingles
- Directions to build bat houses can be found at: www.ct.gov/dep/cwp/view.asp?A=2723&Q=325964
- **Mounting -** Bat houses should be mounted on buildings, without metal siding, or poles; not trees. Wooden, brick, or stone buildings with proper solar exposure are excellent choices, as are locations under eaves. Single-chamber houses work best when mounted on buildings. All bat houses should be mounted at least 12' above ground; 15-20' is better. Bat houses should not be lit by bright lights.

References:

- *Excerpted and summarized from The Bat House Builder's Handbook, 2001 printing, ©1993 by Bat Conservation International, Inc.*
- www.ct.gov/dep/cwp/view.asp?A=2723&Q=325964

Proper Disposal of Pharmaceuticals

Proper disposal of pharmaceuticals is important to prevent ground water contamination. Even after sewage treatment, drug residue may be present in water.

What is Needed for Success:
Disposal Materials – such as water, kitty litter, and coffee grounds.

Directions:

- Leave unused, unneeded, or expired drugs in their original containers (which are usually childproof and watertight).
- Mix liquid drugs with kitty litter, coffee grounds, or another undesirable substance in its original container and put it in another impermeable, nondescript container (i.e. empty can or heavily sealable bag) to prevent identification and throw in trash.
- For solid drugs, add a little water to the original container, then put in another impermeable, nondescript container (i.e. empty can or heavily sealable bag) to prevent identification and throw in trash.
- Find out if there will be any community pharmaceutical take-back programs (such as an Unwanted Medications Collection) or community solid-waste programs that allow the public to bring unused drugs to a central location for proper disposal.

References:

- *Emptying the Medicine Cabinet: Disposal Guidelines for Pharmaceuticals and Personal Care Products*, NH DES – www.des.state.nh.us/factsheets/sw/sw-33.htm

Mortality Disposal

State laws, town ordinances and agency regulations primarily govern disposal of large animal carcasses in Connecticut. Safely disposing of deceased animals is not a subject that most people want to address. However it is a good idea to have a plan, rather than to deal with this issue under a difficult situation.

What is Needed for Success:

- Carcasses should be disposed of within 24 hours so as not to become a health threat.
- If your horse dies of unknown causes, a necropsy (animal autopsy) may need to be conducted – consult with your veterinarian to determine the necessity.

Directions:

There are a few options for the disposal of a deceased horse:

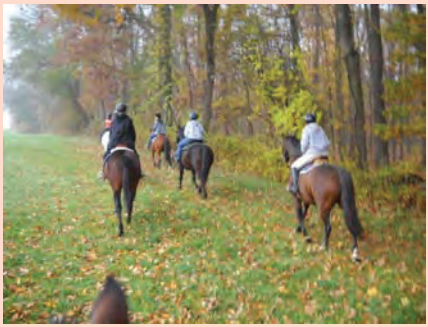
- If you have room, bury it on your property.
- Bury in well drained soils; non-traffic areas; distant from neighbors and underground utilities.
- Check the regulations in your city or town.
- Use or rent a backhoe and dig a hole approximately 6 feet deep with a width to accommodate the horse. Cover with fill material and seed.
- Another option is to use a cremation service.
- You could also contact a renderer to pick up the horse.

References:

- Habitat for Horses, www.habitatforhorses.org
- Bay East Equestrian Network, www.bayequest.com
- Connecticut Veterinary Medical Diagnostic Laboratory – http://cvmdl.uconn.edu
- Connecticut Horse Council Carcass Disposal Brochure

Trails

It is important that trail riders, as horse owners, leave a good impression when riding on multiuse or any trail. Very few horse owners have enough land to trail ride solely on their own land. Whether it be private, state or federal lands, it is important for the continued use of these trails to leave no impact.



What is Needed for Success:

- Consider other users and the environment.
- Follow all rules and regulations for the area you are using.

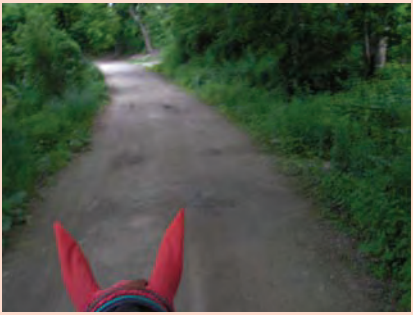
Directions:

- Believe it or not, many non-horse owners object to finding piles of manure! Teach your horse to keep walking while defecating. This will allow the manure to break up and degrade quickly.
- On multiuse trails, you might want to dismount and kick the manure off the path. It will provide fertilizer for the plants and provide a clean path for other trail users.
- Leave gates as found.
- Only ride in designated areas.
- Ride single file to minimize widening trails.
- Try not to ride immediately after rain events to minimize mud and erosion.
- Teach your horse to walk through puddles. Many horses tend to walk on the edge of trails thereby widening them and potentially killing more vegetation.

- On Connecticut's state lands, it is illegal to make new trails, alterations to trails, or cut trees/brush without expressed permission of the DEP.

Sources:

- ***Trail Etiquette***, the Connecticut Horse Council, Inc., P.O. Box 57, Durham CT 06422



Good Horse Neighbor Guidelines

Good horse neighbor relations are imperative to keeping horses, owners, and neighbors in peaceful coexistence. Below are guidelines that touch on how and where to place structures; manure piles; and manage pests to keep good neighbor relations.

- Structures that house horses should not be closer than 40 feet from abutting residential property lines and not closer than 100 feet from abutting residential homes (local zoning regulations may have stricter laws regarding this issue).
- Fences should be strong and well maintained in order to keep animals in, as well as keeping neighborhood pets and children from entering.
- Manure piles should be managed and placed in a low profile area of the property that is least visible to neighbors. Manure should be managed and removed from property or spread onto fields in a timely manner. This will minimize the culmination of noxious odors.
- Vegetation should be well clipped and pools of water should be drained or dealt with to minimize fly and mosquito breeding. Use of an Integrated Pest Management program is critical to keep fly population in control.
- Strong and secure feed storage bins should be used. Vigilance in maintaining a clean feeding area will minimize rodents.
- Permission should be received by riders ***prior*** to riding horses on private lawns, fields, forests, etc., and careful etiquette should be practiced.

THE HORSE FARM OF ENVIRONMENTAL DISTINCTION

If you have one horse or more and your horse keeping practices are environmentally friendly, HEAP would like to suggest that you apply for the *Horse Farm of Environmental Distinction* Award. If you apply, judges will visit your farm to review your management practices that protect the environment. If you receive a qualifying score, you will be awarded a colorful, aluminum 18" by 24" *HORSE FARM OF ENVIRONMENTAL DISTINCTION* sign to proudly display at your farm. The judging takes place in the spring and the deadline to apply is April 1st. For more information or to apply for the award, contact your local Conservation District or the local office of the Natural Resources Conservation Service.

The Horse Environmental Awareness Program is a coalition of Connecticut agencies and groups creating environmental awareness within the equine community. Members include: the Connecticut Conservation Districts; the Connecticut Department of Agriculture; the Connecticut Department of Environmental Protection; the Connecticut Farm Bureau; the Connecticut Horse Council; the Connecticut Water Company; King's Mark Resource Conservation & Development Project, Inc.; the United States Department of Agriculture's Natural Resources Conservation Service; the University of Connecticut Department of Animal Science; and the University of Connecticut Cooperative Extension System.

NOTES

NOTES

"Good Horse Keeping" Contributors

North Central Conservation District

King's Mark Resource Conservation & Development Project, Inc.

USDA Natural Resources Conservation Service

Connecticut Environmental Review Team

Connecticut Horse Council

UCONN Department of Animal Science

UCONN Cooperative Extension System

Connecticut Council on Soil and Water Conservation

Connecticut Farm Bureau

Connecticut Department of Energy and Environmental Protection

Connecticut Water Company

Other supporters of the Horse Environmental Awareness Program (HEAP)