BEST MANAGEMENT PRACTICES FOR HORSES

With a population of 168,000 horses in New York that produce between 1,344,000 to 1,512,000 tons of manure annually, protecting the environment can be a challenge for horse owners. Another major concern caused by horses is increased erosion.

Without the use of proper management techniques, nutrients from manure and erosion can have a significant impact on water quality. Runoff of water from rain or melting snow can pick up and carry contaminants such as nutrients, pathogens, and bacteria from manure and soil particles. Then, they are deposited in streams, lakes, or ponds where they contaminate the water. This contamination of water can make it unsuitable for drinking, cause health problems in humans, destroy wildlife and aquatic habitat, and make it unsuitable to use for recreational activities.

Managing manure and pastures in order to keep nutrient, soil, parasites and pathogens from entering ground water and waterways can be a challenge, but utilization of best management practices or BMPs can help solve the problem. Many best management practices can be used singly or in combination to protect water resources.

MANURE MANAGEMENT

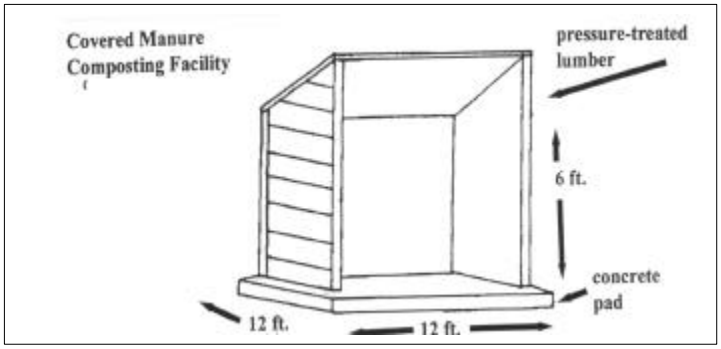
Many horses live in rural areas where neighbors are not a problem, but today urban sprawl has put a significant amount of horses in suburban areas where the problem is more complex. Not only are the traditional problems of preventing contaminants, pathogens, and parasites from entering ground water and waterways an issue to be dealt with, but manure odor, fly problems, and visual aesthetics must be also considered.

A ton of fresh manure containing bedding has an average nutrient content of 13 pounds of nitrogen, 5 pounds of phosphorus, and 13 pounds of potassium. Approximately half of these nutrients would be available to crops in the first year. The unused balance would be available in successive years.

Spreading manure on fields is one option that may be utilized, but is not always feasible for a variety of reasons. Lack of land to spread on may be a major limiting factor and overspreading manure on these fields can add excess nutrients to the soil. These excess nutrients have an increased potential for entering ground and surface water. Proximity of neighbors can also be a problem due to odor problems caused by the manure. Pastures are not a desirable place to spread fresh manure, since the manure may contain weed seeds and parasite eggs. On fields adjacent to streams, manure should not be spread within 100 feet of the stream bank because of its potential to enter the stream due to flooding or runoff from heavy rains. Manure spreading should also be avoided within a 100 foot radius of a well due to potential contamination of the well. Spreading manure during the winter months is also a problem since the potential for runoff is increased due

to the frozen ground, especially on fields with steep slopes.

Storing manure and composting it is another option that can be used. This manure should be stored properly in places where runoff can't enter waterways or flood waters can directly deposit manure in streams. The storage area needs to be dry and level so that surface water can't run through it. Covering the storage with a tarp or roof will also help prevent the contamination of groundwater and surface water and decrease the potential for fly breeding. An average horse will need a 12' x 12' area or 144 square feet of confined space to hold a year's supply of manure. The storage must also be capable of being able to allow manure to accumulate to a depth of 3 - 5 feet. For aesthetic purposes this structure may be camouflaged by planting a screen of shrubs or trees.



Proper storage of horse manure for composting can be handled in several ways and storage structures are sized based on the number of horses. It may be as simple as a concrete pad with concrete or wooden walls that may or may not have a roof. Bins with wooden floors can also be constructed. With a large number of horses a windrow system that has a sloped concrete pad that drains into a catch pond with a level spreader and filter area may be the best solution.

Composting is a means of handling horse manure that has many benefits. Chances that manure contaminated runoff will reach surface water bodies are reduced. It also reduces the chances of contaminating ground water and private wells in the area. Compost is a wonderful soil amendment that is rich in nutrients and organic material. Finished compost typically contains .5% nitrogen, .4% phosphorus, and .2% potassium. Parasites, pathogens and weed seeds are killed by the heat generated by manure during the composting process. Fly populations will decrease due to the elimination of their breeding grounds. The overall volume of the manure prior to composting will be reduced by approximately fifty percent after composting. When properly composted, the manure is virtually odorless. Best of all, this material is a product that may be marketed to neighbors and local greenhouses.

During composting, microorganisms break the manure into a dark crumbly, earthy smelling form of decomposing organic matter. The process is carried on in a moist, aerobic environment and the decomposition process releases carbon dioxide, water vapor, and heat. Composting usually takes 30 to 90 days to complete. Decomposing manure must be kept moist, piled, and turned periodically. Horse manure that contains bedding has the carbon and nitrogen necessary for successful composting. Ideal moisture content of the decomposing manure should be around fifty percent. Oxygen is also

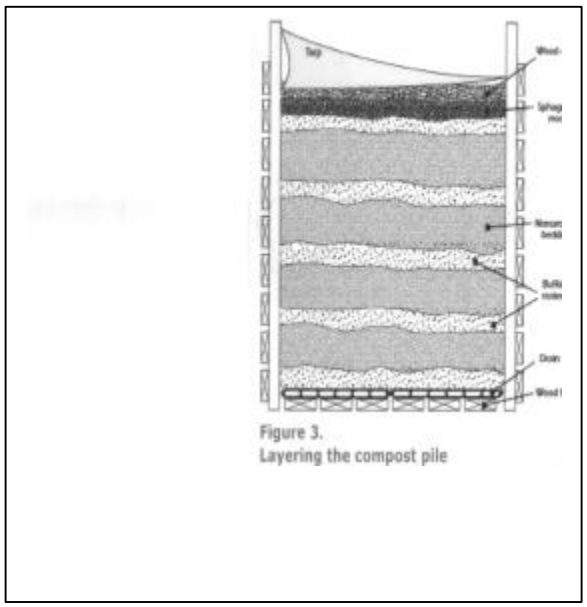


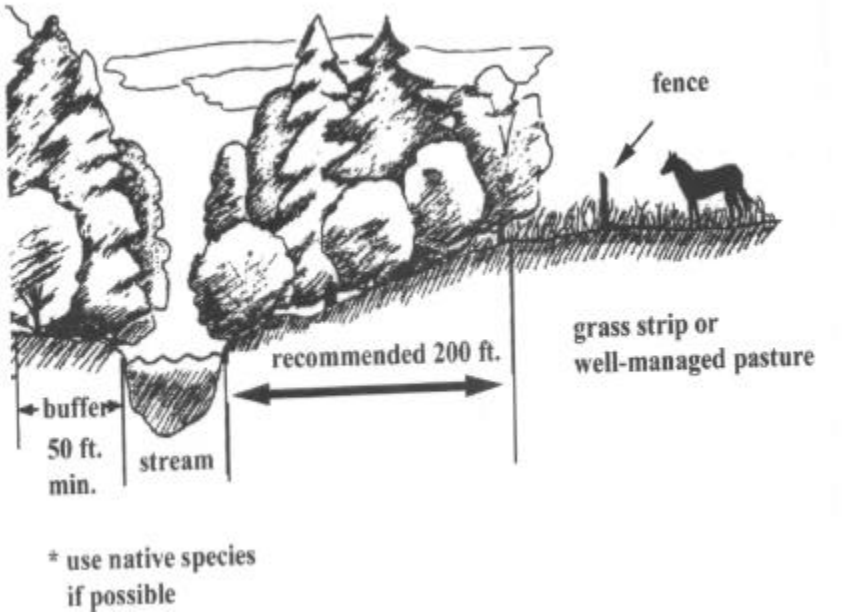
Figure 3.
Layering the compost pile

essential. Piled manure must have sufficient air spaces for the microorganisms to breathe while they decompose the manure and for the carbon dioxide produced to escape. It is important to have the proper proportions of materials to produce quality compost. Since different types of organic materials compost differently, the type of bedding used will affect the ease and rate of composting. The compost's composition can vary greatly, depending on the types of bedding used and the horse's diet. Trial and error will allow the composting process to be customized to fit the horse owner's specific combination of manure, bedding, and other organic materials.

Vermicomposting is another method of composting. Earthworms are used to turn manure into a low odor, nutrient rich, earthy material that makes good potting soil and is becoming very popular with nurseries and greenhouse growers. Preliminary trials with vermicompost were conducted by Michigan State University Extension Agent Charles Gould and a local nursery. Superior growth rate and color was produced in geraniums grown in vermicompost/worm castings vs. plants grown in conventional potting soil. To produce the compost, a cylinder shaped tube made from metal and high grade plastic was used. The tube, called a Worm Wigwam measured 3 feet across and 3 feet high. Manure and bedding were layered in the tube and 20 pounds of redworms were added. Periodically, the worms and worm castings were removed and screened. Worms were put back into the Wigwam to compost more manure and the castings/vermicompost were bagged and sold as potting soil at 75 cents a pound. One problem encountered during the composting experiment was that mature worms couldn't survive the extreme cold. Temperatures must range between 55 and 80 degrees in order for the worms to survive and produce compost. With an initial setup cost of $900, it is estimated that three horses can produce enough manure annually to be turned into compost worth approximately $12,000 if all the compost is sold.

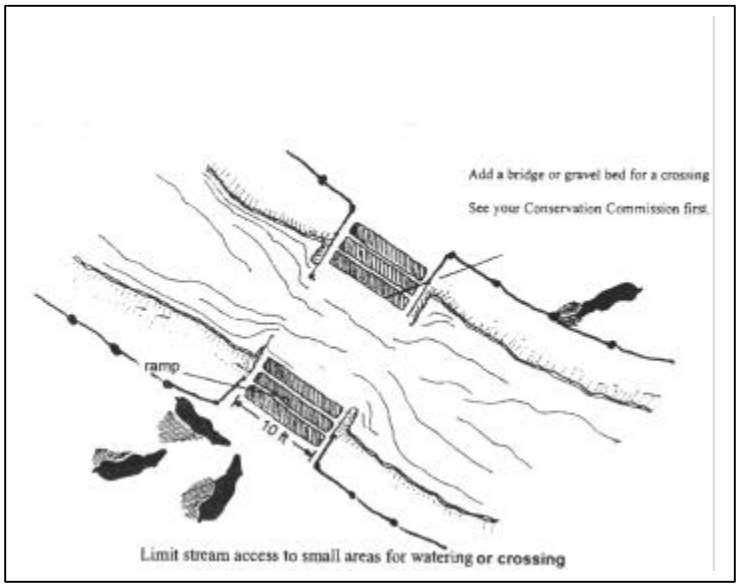
Another best management practice that is inexpensive and can be utilized to protect streams and surface water bodies from contaminants and sediment are vegetated buffer strips. Buffer strips consist of planted or naturally occurring vegetation, such as trees, shrubs, and plants. The vegetation slows the flow of water and acts as a filter, screening out sediment, nutrients, pesticides, and other contaminants before they reach the water

body. These buffer strips also stabilize shorelines or stream banks by preventing erosion and slumping. Trees and shrubs planted along the bank provide shade to cool the water during summer, improve aquatic habitat, and provide food and habitat for wildlife. Buffer strips should be a minimum of 50 feet wide and the buffer strip's width will depend on the size and slope of the pasture, soil type, and vegetative cover in the pasture .



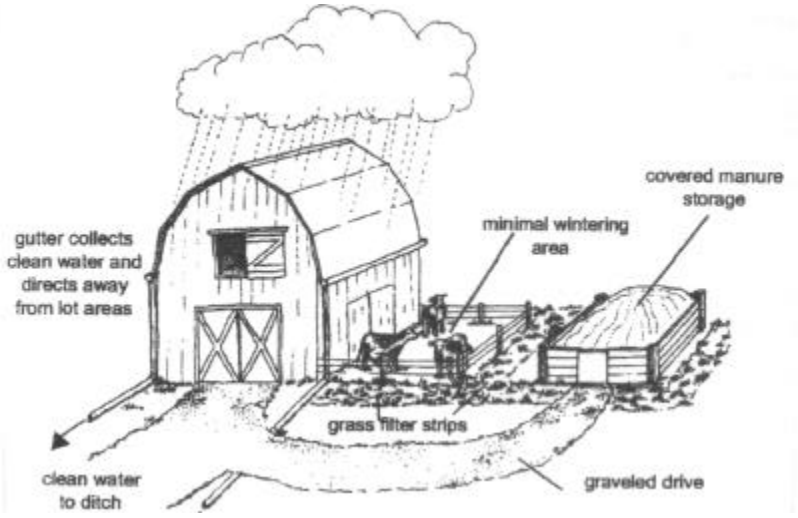
The strips are divided into three zones that are measured horizontally in the direction of flow. Zone 1 begins at the top of the stream bank with a minimum width of 15 feet and is composed of native tree and shrub species. Zone 2 begins at the edge of zone 1, will extend a minimum of 20 feet and is also made up of a variety of native tree and shrubs. Zone 3 begins at the edge of zone 2, does not exceed an average width of 20 feet and is composed of native grasses. Exact width of a buffer strip for individual sites can be determined by contacting the local NRCS and SWCD office for assistance.

The most inexpensive and simplest way to establish a buffer is to quit mowing the area and allow or plant trees and shrubs in the buffer area. In several years time native plants will gradually establish themselves. Animals should be fenced out of the buffer area in order to allow the buffer area to be established and protect the stream and stream banks. In addition, manure should not be spread in the buffer strip area because of the strip's proximity to surface water.



Use of stream bank fencing is another practice that will protect streams. No manure will be directly deposited in the water, stream banks will be stabilized and sediment pollution will be reduced, because the vegetation will be protected from over-grazing and animal traffic. Lack of animal traffic up and down the banks will also help keep the banks from collapsing and depositing sediment into the stream. If it is unavoidable, and horses must drink from or cross the stream, damage can be minimized by constructing a ramp fence system, using gravel as a base to allow horses access to the stream for drinking or crossing purposes. Width of the ramp will vary, based on an individual horse owner's needs. A more expensive means of allowing horses to cross streams and protect the stream is to construct a bridge.

The impact of rainwater around the barnyard can be minimized by keeping roof runoff from dumping onto the ground near feeding and high traffic areas. The goal is to keep clean water from becoming contaminated and entering water bodies. Another benefit



from diverting this clean water is less mud around barn and feeding area, and a healthier environment for horses. Management of roof water is usually accomplished by installing roof gutters and placing downspouts so that they drain into underground outlets or heavily vegetated filter areas.

PASTURE MANAGEMENT

Many horse owners utilize pastures as part of their horse management program. Pastures offer many benefits to horse owners and with proper management can also protect the environment.

Pasturing allows horses to spread manure over large areas of grass covered sod, instead of concentrating it in high traffic areas used for feeding, loafing, and exercise where there is little vegetation to protect water quality and prevent soil erosion. Removal of horses from these high traffic areas will allow a vegetative covering to be established and decrease soil erosion. Eliminating the large amounts of manure deposited in a small area containing little or no vegetation, and having the manure spread on a heavily vegetated area such as a pasture will also help protect water quality by preventing run off of nutrients. In addition, the manure will provide nutrients for the plants in the pasture and reduce fertilizer costs. Labor and equipment costs will also be reduced since stalls will not need to be cleaned and the horses will harvest their own feed. When properly managed, pastures located along roads in residential areas can provide passing motorists with a scenic landscape that is dotted with grazing horses, promoting a favorable image of the horse industry.

Although pastures offer many benefits, several issues must be considered before it becomes a part of the horse owner's management program. Installation costs and maintenance of fencing are the two most important considerations. Pastures must also be managed to control weed populations, maintain productivity and forage quality, and to avoid overgrazing.

To maximize productivity, pastures must be managed carefully. Soil testing will give the horse owner essential information about the soil's fertility. The test results will provide information about the level of nutrients present in the soil and their availability for plant utilization, and soil pH. If the test results show a deficiency, additional nutrients for plants may be supplied by manure, lime, or commercial fertilizers. The test results will provide general recommendations for fertilizer and lime applications, or your local NRCS and SWCD office may be consulted for recommendations. Weed control in the pasture

must also be considered, since weeds compete with desirable plants. Grazing will provide some control, but will not eliminate all weed problems. Identification of the weed species will help determine the control strategy. Methods of control include: rotational grazing, mowing at scheduled intervals, hand pulling, and sprays that are applied when horses are not grazing in the pasture.

Another consideration when pasturing horses is determining the quantities and varieties of plants that are going to be grown in the pasture for the horses to consume. Grasses are more productive in cool weather at the beginning and end of the growing season. Legumes, such as alfalfa and clover are more productive during the warmer midsummer months, produce nitrogen in the soil that enhances the growth of pasture grasses, and increase the protein content of the forage mix consumed by the horses. It may not be worth the extra cost of including legumes in the pasture mix if a high level of management for the pasture is not going to be applied. Pastures with a large percentage of legumes can also cause bloat in horses if they are not introduced to this type of forage on a gradual basis. In addition, grasses have the advantage of being more durable and are more resistant to trampling by horses. NRCS or the local SWCD office can be contacted to help determine the most desirable pasture mix for New York horse owners.

Overgrazing of pastures will decrease or eliminate desirable forage plants and increase the amount of weeds present in the pasture. Pastures should be stocked at a rate that meets the horse's feed needs and the pasture's forage yield. An average horse needs to consume up to 2 percent of their body weight daily in pasture forage. With a low level of management and poor quality pasture, horses should be stocked at a rate of one horse to every two to four acres of pasture if a continuous pasture system is utilized. Forage plants, if given a chance to grow between grazings will be more productive and more healthy. This growth can be enhanced by dividing the pasture into equal paddocks and rotating the horses among them. For example, a horse weighing 1100 pounds can consume 27.5 pounds of forage daily. If the pasture yields 1000 pounds of forage and the residency period is 7 days, five one acre paddocks will be needed for 4 horses. To obtain peak quality feed, pasture forages should be between 6 to 10 inches tall when horses start to graze in the paddock. When the pasture is grazed to an average height of 3 to 4 inches, the horses should be moved to another paddock. The now vacant paddock should be mowed to a height of 4 inches to discourage the growth of weeds and eliminate over mature pasture vegetation. Experimentation will allow the horse owner to come up with the optimum rotation length for their operation. During periods of rapid growth, horses will need to be rotated more frequently or hay will need to be made from some of the paddocks to avoid forage that is too mature and has little feed value. Care should be taken not to place too many horses in a paddock, because when horses are overcrowded there is the potential for injuries caused by kicking and biting .

Protecting the quality of water and preventing soil erosion are very important issues. In addition to utilizing the information in this brochure, additional assistance is available from the Natural Resources Conservation Service and your local Soil and Water Conservation District.

References and Other Sources of Information

http://es.epa.gov/oeca/ag/sectors/animals/anbmp.html#Nutrient/Manure Management
Agricultural Best Management Practices from the US Environmental Protection Agency

http://www.state.ma.us/dep/brp/www/wwpubs.htm
Information and publications about Massachusetts' DEP Drinking Water Program and Regulations

http://www.massdfa.org/farmfunding/aeeo/index.htm
Massachusetts Department of Food and Agriculture

http://www.nass.usda.gov/ny/06jun/equ0601.htm
Statistics about horse numbers in New York from the New York State Department of Agriculture and Markets

http://www.gov.mb.ca/agriculture/livestock/publicconcerns/cwa01s02.html
Nitrates in soil and water, Manitoba Agriculture and Food

http://www.extension.umn.edu/distribution/naturalresources/components/7540_04.html
Manure and Pasture Management for Recreational Horse Owners, Making Better Use of Your Horse Pasture, University of Minnesota Extension Service

http://www.msue.msue.edu/learnnet/vermicompost 101100.htm
Here's an Idea: Compost Horse Manure Using Worms, Michigan State University

Clemson University Extension, Manure Management - LL53 1994

http://www.nrcs.usda.gov
Natural Resources Conservation Service, a part of the USDA works with people to conserve and maintain the environment

For more information, contact: