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Where possible, use alternative nutrient sources.

Depending on your location (and management constraints), biosolids, poultry litter, and other animal manures can offer a source of low-cost nutrients, particularly N and P, as well as organic matter. This may reduce need for N and P, but K likely will still be necessary.

Feed hay back on hay ground. One may cringe at this idea given the potential to damage a hay stand. However, this can be an opportunity to return nutrients to the field under the right circumstances. Feed when the ground is frozen or dry. Unrolling bales will further reduce animal impact.

Many farmers may have adequate soil pH and nutrients but feel the need to add N to increase the hay crop.

However, stands on fertile ground and with significant legumes may not warrant N inputs at today's high prices.

As with P and K, pounds of forage produced per unit of N input will be greater at low fertility rates. But will it pay?

I'm no economist, and you should do your own numbers, but a little back-of-the-envelope calculating may be helpful to

N rate lb/ac	Yield ton/ac	lb forage per lb N	Hay value, \$/ton				N cost \$1.03/lb	Value minus cost by \$/ton			
			\$60	\$80	\$100	\$120		\$60	\$80	\$100	\$120
			----- \$ per acre -----					----- \$ per acre -----			
0	1.50	--	\$90	\$120	\$150	\$180	--	\$90	\$120	\$150	\$180
50	2.19	27.6	\$131	\$175	\$219	\$263	\$52	\$80	\$124	\$168	\$211
100	2.83	26.5	\$170	\$226	\$283	\$339	\$103	\$67	\$123	\$180	\$236
150	3.34	24.6	\$210	\$268	\$334	\$401	\$155	\$46	\$113	\$180	\$247

These yield numbers suggest that if a pound of N generates 25 pounds of forage, it may still be effective to fertilize at between 75 and 100 pounds N per acre—provided you're getting \$100 per ton. However, if your hay brings \$60 or \$80 per ton, it may not make sense to fertilize at today's prices.

consider the value of N inputs and hay outputs to determine if this is worthwhile.

I dug up some numbers from a recent Kansas study looking at fescue response to N. These were newly established fields, so response to N (about 25-28 pounds forage per pound N) above a "0" fertility rate may be higher than in long-term productive hayfields and pastures.

If your hay field has abundant clovers or legumes, the fertility response may be much lower.

These yield numbers suggest that if a pound of N generates 25 pounds of forage, it may still be effective to fertilize at between 75 and 100 pounds N per acre—provided you're getting \$100 per ton. However, if your hay brings \$60 or \$80 per ton, it may not make sense to fertilize at today's prices. If you do plan to fertilize cool season hay fields, try to time applications to periods of warm spring weather when forages are rapidly growing.

To the extent possible, apply the fertility 1-3 days ahead of rain.

Many farmers use urea as their fertilizer N source, but urea is subject to high losses (up to 40%!) from volatilization. Urea with adequate NBPT urease inhibitor will reduce volatilization and increase use efficiency.

Generally, nutrient needs for pasture soils are limited if the fields are well-managed because nutrient removal is low. However, this may not be the case where fields are overgrazed and subject to erosion.

Using better grazing management can allow plants to recover and be more productive, and will also improve nutrient distribution across the farm.

Remember, too, that clover is the best N resource in pasture settings. Abundant and productive clovers may supply 100-150 pounds of N per acre annually.

Maryland Horse Farms and the Chesapeake Bay Graziers

by Jane Thery, President and CEO of Green Horse Enterprises, LLC

Green pastures and healthy soils are a net plus for our natural environment.

Although most commonly thought of as pastures for ruminants such as cattle and sheep, horses are a large and growing part of our Maryland agricultural scene. About one-quarter of Maryland's agricultural land is in horse farms, topping 700,000 acres.

Horse farm owners generally combine a commitment to quality land stewardship, an appreciation of good pastures for horse health, and an interest in environmental protection, including the health of the Chesapeake Bay.

Among the newer generation of horse owners and riders, advocacy for a clean environment is strong.

Young people want their sport and the home for their horses to be "green." Or as Amy Burk, Director of Equine Studies at the University of Maryland, College Park states, they are committed to, "Saving the environment one blade of horse pasture grass at a time."

Agricultural extension officers not only look to improve conditions for livestock but are also promoting best management practices on farms that reduce pollution and support the natural environment. This has led to a broad discussion on how to define and promote "green" horse farms.

What is a "green" horse farm? Climate change discussions are on the top of the global agenda in 2022 with a big focus on reducing the atmospheric pollutants of carbon dioxide and methane.

These gases are shown to create an effect that traps solar heat in the atmosphere, warming the planet and causing sea level rise and stronger storms.

In our region, water pollution throughout the Chesapeake Bay watershed—which threatens clean water availability and wildlife—is being confronted by multiple government and non-government groups from the Chesapeake Bay Foundation to your local sewer authority.

The relationship between these global and regional agendas and horse farms falls into three categories: water, carbon, and wildlife habitat.

An environmentally-sound, or "green" horse farm, is managed with the best practices to

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control water run-off and erosion, reduce carbon emissions and fix carbon in pastures and trees, and protect wildlife habitat. These practices create a healthy environment for the horses and demonstrate high-quality farm stewardship.

On a “green” horse farm, water management is key. The basic principle is to slow the water down while it flows to areas where it can filter into the ground.

Water runs off rooftops, pastures, and paved surfaces. The first step in water management is to see where the water naturally flows and collects.

Barns and indoor arenas need gutters, downspouts, and a way to draw the water away from the structures—such as tubing, French drains, and underground diversion systems.

Once away from the buildings, the water needs to be captured in vegetated areas with trees and native plants and/or ponds to reduce the water flow off the farm and promote water filtration into the local water table.

Water flowing off paved areas is slowed with grassy verges, gravel, and diversion socks to reduce erosion and push the water into vegetated areas where it can be absorbed.

Water control in pastures is essential to horse health. To avoid muddy areas, runoff into neighboring areas and streambank breakdown, streams need to be fenced off and a wide vegetative border maintained between pastures and watercourses on the farm.

Pastures and paddocks with good grass cover and/or a footing system that reduces mud keeps the water draining well and the horses’ feet healthy.

This quality water management will protect horse health and the local watershed from nutrient and sediment runoff.

The carbon footprint of your horse farm rests on how much fossil fuel energy is used and the carbon fixing role of soil, pastures, vegetation, and trees.

Building design to maximize natural light and natural ventilation is the first step.

Using the principles of airflow physics, the barn construction can create updrafts to provide fresh air for the horses with minimum use of electricity.

Skylights and positioning barns and arenas can maximize natural light for the horses and minimize artificial lighting needs.

An energy audit highlights ways that energy use efficiency can be increased with, for example, LED lights and low-power-use heating systems.

The move toward installing solar panels and switching to electric vehicles reduces the overall farm use of fossil fuels. These methods eliminate the generation of carbon dioxide.

For carbon dioxide reduction, or “fixing,” horse farms have a super power when they include healthy pastures, natural vegetation, and trees.

Healthy pastures fix carbon in the grasses and in the soil. Keeping roots in the ground and deep topsoil with active microbes is a proven way to fix carbon.

AND great pastures are great for our horses. Horse farms with woodlots, landscaping, and natural vegetation provide carbon fixing across all of our agricultural land.

Also, unlike the ruminants, the single-stomach digestive system of horses produces very little methane.

Part three, after water and carbon, is wildlife habitat. Most horse farms provide a resting place and feeding grounds for birds and small animals.

Minimal use of pesticides and herbicides helps these wild populations flourish.

Added best practices that help foster habitat include planting specific plants to attract pollinators, restoring streams and stream banks for fish and other aquatic animals, eliminating invasive species and planting native ones, providing bird houses, and minimizing noise and light pollution.

Finally, a word on horse manure management. Horses provide us with about fifty pounds of natural nutrients each day as they digest large amounts of vegetal products and poop.

The best management practices for horse



manure are: dragging pastures to break up manure mounds for worm control and soil absorption, picking up manure from paddocks and stalls, storing manure on a hard surface, leveling areas to avoid runoff, regular picking up of manure off the farm, and, if feasible, composting and using and/or selling composted horse manure as a natural and local soil amendment.

A “green” horse farm can be built from scratch with careful site design, knowledge of the needs of the horses and the clients, and a good dose of common sense.

An existing horse farm can be upgraded with new water management installations, pasture improvements, solar panels, and barn redesign, just to name a few.

There are enormous resources available in Maryland to find out how to do this from local Soil Conservation Districts, the University of Maryland Agricultural Extension, and county and state offices of agriculture and the environment. There are also new sources of funding to help out with the costs as well as many conservation and agricultural consultants for guidance.

The horse community is a great asset to the natural environment and it can be even better with education on the elements of a “green” horse farm and implementation of these best management practices. Grazing horses and beautiful green pastures are a plus for our communities and our natural environment.

Author Jane Thery is President and CEO of Green Horse Enterprises, LLC. In 2011, she founded the Maryland Horse Council Farm Stewardship Committee. To learn more, visit greenhorsellc.com and mdhorsecouncil.org.