

Seeking Balance:

Elements of a Successful Horse Grazing System



Contributors*

Earlier edition by Gwyneth Harris, former Pasture Program Coordinator
Content of this edition has been revised and edited by
Dr. Rachel Gilker and Dr. Betsy Greene

Design and layout: Jennifer Colby • Photos: Jennifer Colby and Gwyneth Harris
Additional editing by Rebecca Haskell, Dr. Lyn Carew and Dr. Krishona Martinson



UVM Equine Science Program
<http://asci.uvm.edu/equine>



Pasture Program
<http://www.uvm.edu/pasture>



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Dear Readers,

Horses are quite possibly the most difficult type of livestock to graze—many horse owners have given up entirely. Others manage their pastures as “exercise paddocks”, or simply don’t manage pastures, assuming that weed and “putting green” pastures, mixed with mud lots are simply “the way horse pastures are”. It is not at all surprising either, because horse management and ownership means horses are considered the priority. Managing pastures for forage is typically an afterthought even though many horse owners do allow their horses pasture access for exercise and for behavioral reasons.

As more horse owners are considering ways to better utilize their land base and reduce feed costs, pasture management for forage production has come under consideration. The latest nutritional research indicates that forage-based diets are the best option for horses. However, horses’ high energy levels, reliance on flight as a primary defense, hooves, teeth, and their need for low protein, high fiber forage, combine to make it hard to come by healthy pasture.

In the development of grazing management strategies for any type of livestock, it is important to look at the animals’ digestive tracts, nutritional needs, behavioral patterns, grazing strategies, and history as a species. Andre Voisin developed his concept of management-intensive grazing based upon the movement of herds of grazing animals over grasslands. Horses evolved as migratory grazing animals, but having a single-chambered stomach instead of a four-chambered one, they digest their feed very differently from cattle. The key factor in differentiating equine feed needs is that they evolved to eat much “poorer” quality feed—that is more mature, lower in protein and higher in fiber. To a horse, high fiber is quality feed! Horses have the ability to take in vast quantities of feed without stopping to ruminate as cattle and sheep do. A healthy horse on pasture will happily graze for up to 20 hours a day. The fiber in forage—hay or pasture—is the single best source of energy that you can give your horse. This is why high energy grain can cause such disasters when overfed and why horses are so prone to overeating.

Pastures, unlike hay, can have excessive levels of soluble protein (reaching 28%), but as plants mature, the ratio of protein to fiber falls making it not only more appropriate to the nutritional needs of a horse, but also much less likely to cause problems such as obesity and founder, which can be associated with pastured horses. A couple of other vagaries of evolution: horses developed the hoof—the most effective known method of destroying pasture plants; and horses have two sets of front teeth—the second most effective method of destroying pasture. These chompers make it possible for horses to overgraze leaving pastures looking like putting greens. These two physical characteristics, combined with horses’ fussy grazing, make it very important to monitor pastures to catch and prevent situations which favor soil erosion.

So, as a horse owner, you may be asking “How do I manage my pastures to produce quality feed without health problems or soil erosion?” There are three main things that determine the health of your pasture system: the pasture plants; your horses and their grazing behavior and effects; and most importantly, the role that time plays in the interaction between your horses and the pasture plants.

There is no simple prescription for perfect pastures, but here is a primer to help you on your way to keeping those horses in grass, decreasing soil erosion, and striking a balance between your horses’ needs and your pastures’ needs.

Good grazing and happy healthy horses,
Betsy & Rachel

Elements of Your Grazing System

Acreage

To begin with, make sure that you have enough land to support your horses. Generally, this means one to two acres of healthy pasture per horse per year. You will already be aware if your horse is an “easy keeper” or not and how productive your soil is, needing more or less land in this spectrum.

If you don't have enough land for the horses you have, you will need to seriously consider options to limit negative impacts to your pastures. One is to have fewer horses. This might seem extreme, but if you have inadequate pasture, you must have a way to manage the area that does not result in erosion and mud. Both of these factors can cause serious water quality issues for you and your neighbors, along with many avoidable health problems for your horses.

If you don't have enough pasture for your horses, but you're not going to part with any of them, then consider managing the timing of your grazing differently, allowing each horse just a percentage of the day on pasture, or stabilizing one paddock for “all weather” use. This is often called a “sacrifice area”. This is a place where the horses can be kept off of the pastures while the plants recover, which is the single most important part of creating a healthy, long-lived, productive pasture. More will be said about this strategy later on. The resources found at the end of this primer include additional information on renovating sacrifice areas.



Think about matching the right number of horses to the right paddock size. Large paddocks are good for exercise, but can become overgrazed or undergrazed easily.

The first layer of protection on your pasture land is the plant community living there.

What's the right amount of acreage?

An acre of pasture with forage 6"-8" tall has an average of 1000-1200 lbs. of available dry matter. This includes only the upper 4"-6" of forage that should be grazed, and not the lower 2"-3" inches that should be left to recover.

A horse weighing 1000 lbs typically needs to consume about 1.5% of its body weight in dry matter each day, or 15 lbs. This would be equal to a section of pasture the size of 0.02 acres.

1000 lb. horse X 0.015 dry matter intake (DMI)/day = 15 lbs. dry matter intake per day

15 lbs. forage dry matter intake/1000 lbs. available forage per acre = 0.015 acres, or about a 25' X 25' area.

Grazed forage can be 75-85% water, so that 10-20 lbs of dry matter would equal about 100 lbs. of grazed forage. Similarly, hay has water content of 10-20%, meaning the comparable weight of consumed hay would be 12-25 lbs.

Plant Growth

As a horse owner, you make it your business to know all there is about your horse and its needs. You know that he or she needs higher protein feed as a weanling or when lactating. You know that you need to treat it differently after exercise. You know that a break in feeding or watering can be detrimental or even deadly to your horse. You know the warning signs of many diseases and injuries.

As a manager of pasture land, whether you own or lease the land, it is your responsibility to know the needs of your pasture as well as you know the needs of your horse, because it is yours to take care of, and because by responding to its needs you'll have healthy horses and reduce your feed costs. The first layer of protection on your pasture land is the plant community living there.

Forage plants do a number of things:

- They comprise your horse's feed during grazing
- They hold soil in place, build organic matter and soil fertility, and protect the soil from hooves, rain, and run-off
- They absorb and incorporate soluble nutrients, such as nitrogen, and prevent them from reaching ground waters
- They capture sunlight and manufacture carbohydrates out of carbon dioxide in the air—creating free feed for your horse and counteracting global warming

The first step to manage your plants is understanding how they grow. This first stage of plant growth happens when the plant begins to grow in the spring, or when it regrows after grazing.



*Managing
pasture plants
does a lot
for you,
your community,
and your horse.*

Elements of Your Grazing System

Time (varies with season)

1) As plants grow back from grazing, they grow very slowly. This is due to the small leaf area limiting photosynthesis. Grazing too early in the plants' recovery forces the plant to draw on limited root reserves to regrow. Repeated grazing of desirable forage plants will cause them to die out, leaving room for the growth of weeds and less desirable forage plants (See Fig. 1).

2) The highest production rate occurs in the middle of the growth curve; this is also the time for the most vegetative (leafy) growth. Because of the large leaf area, the plant is photosynthesizing very actively, and replenishes its plant root reserves very quickly. This is the optimal time for grazing, when forage plants are about 6"-10" tall (See Fig. 2).

3) At the later stages of growth, there is very little increase in production, this is the flowering/fruitlet stage when the protein levels fall and carbohydrate levels increase. Forage at this stage of growth becomes stemmy, reproduces and then dies back. It will be of lower quality, and plants of this maturity do not grow back as vigorously (See Fig. 3).

The question is: *how long is the recovery period?*

Time of year	Regrowth period
Late April – Early May	12-15 days
May	18 days
June	24 days
July	30 days
August	36 days
September	42 days +

Figure 4. VT's Champlain Valley average recovery times. (Source: Bill Murphy.)

The recovery time is the time it takes a plant to get from the start of growth to ideal grazing height (See Fig. 4). This can vary greatly during the grazing season and by weather conditions, so you will have extra feed at some times and too little at others.

You can clip excess forage in the early spring with a scythe, brush-hog, or trimmer-mower, and you can feed hay to supplement if needed in August.

A few notes:

- Forage is highest quality in the spring and fall, and frost can cause changes in the feed that might encourage colic or founder, so be careful, and supplement some hay around this time if in doubt (avoid sudden changes in diet). Wait to graze two weeks after frost.

- Remember that when you leave a horse in a

paddock too long, regrowing forage plants will be high in protein. Horses will seek out this desirable forage as regrowth appears and in the case of paddocks that are too large, grazing too much of this lush young regrowth may cause founder.



Figure 1. This pasture is 2-3 inches high. Grazing at this height stresses the plants and forces them to draw on carbohydrates in their roots, weakening them for the next grazing.



Figure 2. This bluegrass stand is near the peak of growth and nutritional quality.

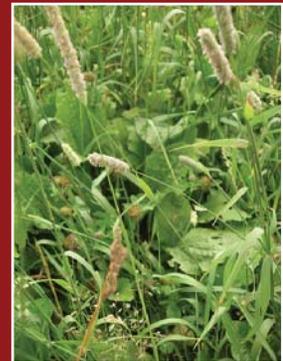


Figure 3. This mixture of broadleaved plants (forbs) and grasses is approaching maturity, as shown by the grass seed heads.

Horse Pasture Management

Horses will always eat what they like best first, and the more options they have, the more selective they will be. When they occupy one space for a long time, they graze down their favorite grass repeatedly, while leaving behind more unpalatable (though still edible) species, such as goldenrod, less desirable grasses, longer grasses, etc. Eventually, favorite species will be depleted to the point where they will not regrow, and in time will die out. When this happens, you will see bare spots in the pasture, and weeds and less desirable forage can, and will, invade. Erosion and soil loss may also begin, reducing the pasture's soil fertility, as well as forage production.

There are two main problems with typical horse pasture management: 1) paddock size and 2) length of occupation. First, when paddocks are too big, there are too many grazing choices for the animals, so the horses eat only their favorite plants. Second, when paddock occupation is too long, favorite forage plants are eaten first and then regrazed before they're fully recovered. Unlike ruminants who have only bottom teeth and a hard palate on top, horses have both upper and lower front teeth. This means that they can graze back down to the ground those plants with as little as a few days' regrowth. These tiny plants have not yet recharged their root reserves. This is why the recommended paddock rest period is longer than the few days it takes for plant regrowth to appear.

Pasture As A Feed Source

Feeding horses on pasture can be challenging, but carefully managed pasture is also the best quality feed that you can give your horse. Always treat a transition to pasture from hay as you would any other feed transition. Take it slow, and keep an eye out for any problems: colic, founder, obesity or

weight loss can all result from improper pasture feeding. A lot will depend on the physiological state and activity level of the horse.

Knowing what you are feeding at any given time is useful too. For example, the ratio of energy to protein changes as grasses grow. Generally speaking, more mature grasses have less energy. Most importantly, the more mature a plant is, the higher the fiber content. In addition, the energy in pastures changes during the course of each day due to photosynthesis—peaking in the afternoon. Weather and seasonal growth patterns also play into the nutritional composition of your pastures. While some of these patterns are predictable, it is always possible to get an analysis of the forage you are feeding. See the resource list on the back cover for more information.

Some tips for transitioning to grass:

- Let the horses fill up on hay before going out, to offset the amount of high protein forage that they can consume.
- Limit their initial grazing time (letting them out for 15 minutes, increasing by 15 minutes each day until 8 hours is reached).
- Let the grass get taller before the horses graze it—6"-10" plants will have a better ratio of protein to fiber at this stage.
- Limit the time that horses are in any one area—5-7 days in any one spot is the absolute maximum if you are trying to manage your pasture for forage, three or fewer is more ideal—to ensure that horses are not grazing regrowth.
- Always provide water, free choice minerals and salt to pastured livestock.
- During transitions to pasture, feeding hay can help balance the ration and ease the digestive stress that feed changes place on grazing animals.

A Simple Horse Grazing Plan

1) **Split pasture into smaller paddocks.** The more paddocks you have the better and more evenly your pasture will grow. Recognizing that you're trying to balance forage quality and horse exercise requirements, begin by breaking your pasture into paddocks. Even if you only make 2-3 pasture divisions, your pasture quality will improve.

For horses, you should have at least 6 paddocks for the Vermont grazing season to allow for a maximum rest period of 5 weeks, and an easy rotation schedule of moving the horses once a week. This provides adequate rest most years, while allowing some areas to get more mature and stemmy to provide adequate fiber. Ideally, you should double this number of paddocks, moving the horses every 3 days. However, this is not feasible for many horse owners. See page 2 to calculate paddock sizes.

2) **Move 'em.** Horses in a paddock system, like the one described above, will need to be moved at least once a week. Avoid the temptation to move your horses onto pastures too soon. Begin grazing at 6"-10", pull them off at 3"-4", then allow regrowth. To determine appropriate regrowth timing for the stage of year see Figure 4 on page 4 for a starting point.

If you have one group of horses and six paddocks (the minimum recommended), even when the recovery period is 40 days, you will be able to move the horses once a week, and get back to the beginning of the rotation when the grass is recovered. (6 paddocks x 7 days = 42 days). In the spring, however, you might be only moving through two or three paddocks, and moving once every 5 days (3 paddocks x 5 days = 15 days recovery). You will need to think of a way to manage the other paddocks by mowing, haying or changing animal stocking density by grazing other animals.

Using only two or three paddocks, even if you are only moving once a week, you have only 7-14 days' rest between grazings. This is too short even for rapid, spring flush growth rates. Your grass will not be able to recover, feed quantity will deteriorate, ungrazed weeds will flourish, and the quality of regrowth grazed will be too high in protein for your horse.

3) **Create a sacrifice area.** There will be a time that you want to keep your horses off of your pasture but need them out of the barn. Some of the most common times are during mud season when hooves have hardest impact on wet pasture sods, in mid-summer when there is little feed left and over-grazing is most likely, and short periods in late spring and fall when grasses are lush and horses need to have their intake limited to prevent metabolic problems. A sacrifice area may just be a small dry paddock near the barn, or it may be an area specially surfaced to keep mud down with specialized footing.



This set up, showing sacrifice paddock closest, allows horses to be rotated often and plants rested.

Use the sacrifice area to protect your land. Since an average horse needs one to two acres of land to provide it with feed and exercise for a season, if you have a limited land base

you can't use your pasture as a primary feed source. Then the sacrifice area becomes especially important. Remember that the slope, soil type, drainage, fertility, plant types and water table all determine how much forage the land will produce, and how well it will stand up to horse grazing. If you have questions, contact your local Natural Resources Conservation Service office.

4) **Understand pasture ecology.** Pasture plants all grow in a similar manner with a vegetative stage followed by a reproductive stage. Horses do best on plants late in their vegetative stage or even in their reproductive stage, but pasture plant regrowth is best when plants are grazed in the middle of the vegetative stage. You need to strike a balance here, and remember that a somewhat stemmy pasture is a good thing! The biggest thing to look out for is overgrazing. When horses graze they tend to leave a lot of plants untouched, while grazing their favorites down to the ground. This type of grazing can be hard to recognize from a distance. It looks like there's plenty of feed left out there while in fact the favored plants are being destroyed—not just by loss of leaf surface, but also by shading from weed species. Don't let the shortest plants in the pasture get down to below 2 inches, and think about how you will deal with weeds.

5) **Have a clean-up crew.** There will be weeds in your horse pastures, and so it helps to consider what you will do about them. On a small scale, it is possible to scythe down weeds after each paddock is grazed. Some folks use a lawn mower, or a walk-behind trimmer-mower. If you have several acres or more, you will probably want to have a brush hog to clip paddocks after grazing.

Or, you may want to try some of these innovative ideas.

- a) Graze your horses with other livestock that have different grazing habits.
- b) Follow cattle or sheep with horses to clean up lower quality feed.
- c) Rotate between grazing beef cattle or dry ewes with horses on pasture each year. This can also help with parasite problems.
- d) With less high-strung horses, try limiting paddock size so that they have fewer opportunities to be fussy. Make sure, though, not to push them to overgraze or to eat poisonous plants. This works especially well with draft horses.

6) **Protect erosion hot spots.** Horses are creatures of habit, they will walk the same paths, leave their droppings in one spot, and congregate in favorite areas. These are the places that will become problems for you in your grazing rotation. Take precautions, like creating more than one lane of travel in high-traffic areas, fencing off overgrazed or muddy areas for reseeded and establishment, and stabilizing areas that are consistently heavily used.



Remember that going from a 14 inch stemmy paddock, to one with lush 6 inch grass, also constitutes a feed change, and should be treated accordingly. Try mixing grass types using moveable fencing (half lush, half stemmy)—you'll be surprised at how well most horses will self regulate.

Pasture Care & Management

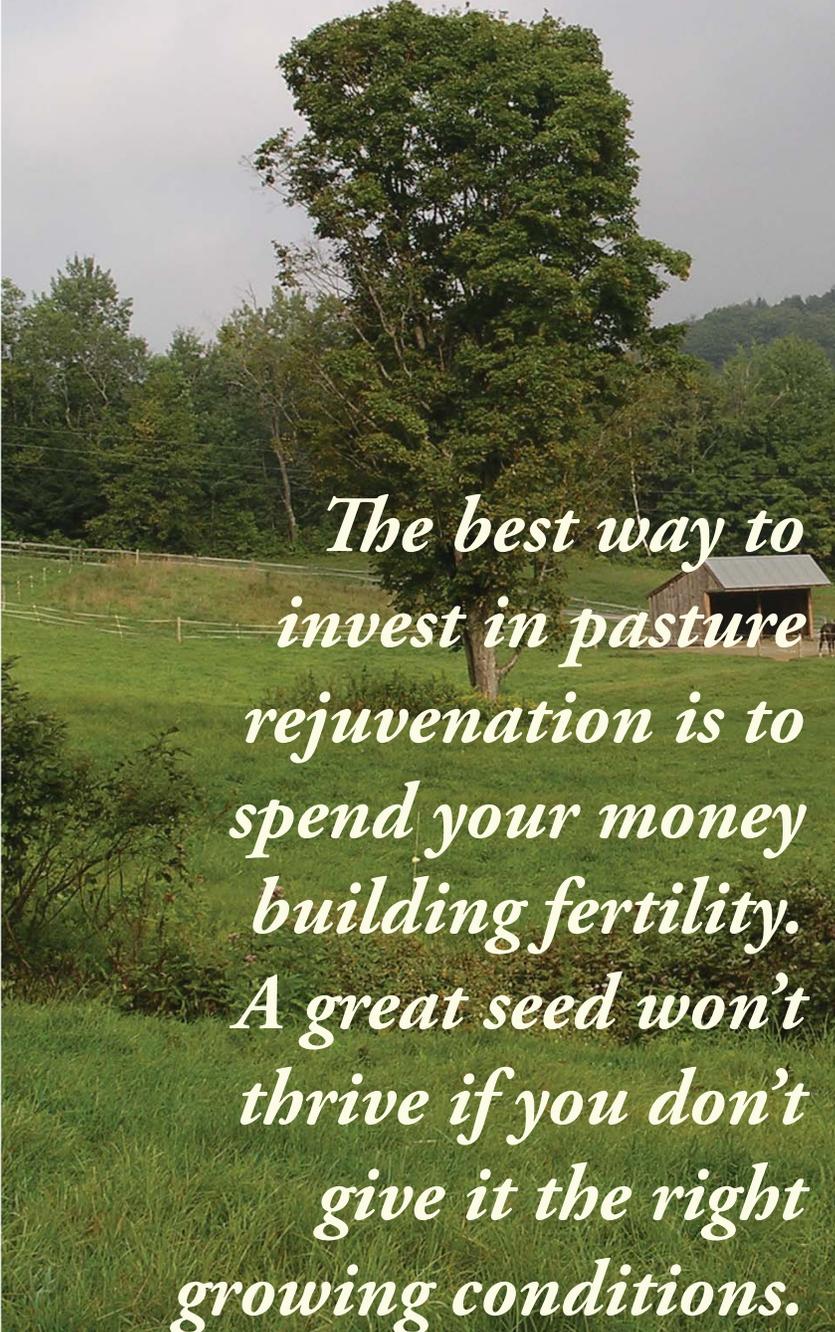
Seeding and Pasture Renovation

Pasture renovation, from plowing up to re-seeding, is usually not necessary to improve your pastures. For seeding, there's no need to spend too much time or money to plow up new areas unless you have a very specific reason. Just seed in bare areas. You'd be surprised at the size of the native seed bank already in the soils, especially legume seeds.

First and foremost, get a soil test (\$14.00, call 802-656-3030 or visit http://pss.uvm.edu/ag_testing/ to get a kit and directions). The most critical amendment you can apply, if needed, is lime. Typically, 1-1.5 tons/acre is the most to apply in a year, so if more is recommended by the soils lab, spread applications out over a few years. You should also look for any major deficiencies, especially of phosphorus, potassium, and calcium, and address those.

If the pasture is populated with undesirable grasses (such as sheep fescue), or if the pasture has been renovated from a forest community, you may want to seed. Even in such cases, seeding is secondary to improving fertility and grazing management. Create the right conditions for pasture to thrive and it will.

Some recommended species are: Kentucky bluegrass, creeping red fescue (endophyte free variety), perennial ryegrass (though its winter hardiness is marginal), and white clover. Other grasses can be incorporated for specific situations. Orchard grass is very tolerant of drought, as is Reed canary grass. Have a diverse mix in your pastures helps to improve and stabilize production throughout the season. If this seems complicated, many seed dealers have mixes for horses. That can make things easy!



The best way to invest in pasture rejuvenation is to spend your money building fertility. A great seed won't thrive if you don't give it the right growing conditions.

The seed you should choose has several key characteristics:

- 1) Tough plants—horse traffic is not light on pastures;
- 2) Avoid low growing plants that spread by stolons. Horse teeth challenge plants by clipping very close to the soil surface;
- 3) Appropriate to soil and climatic conditions;
- 4) Some legumes should be included in the mix (up to 20%), to provide nitrogen to pasture grasses and forbs. Remember, though, that legumes can have too much protein for horses. A good, diverse pasture can have more than 25% protein at some times of the year, and horses need about 10-16%, depending on metabolic state (i.e.: lactating, working, growing, versus maintenance);
- 5) Endophyte free. Endophytes can cause problems in pregnant mares. They are most common in fescues, especially tall fescue.

Seed when you have a nice open, wet surface, and before a rain shower. Use animals to prepare the seeding areas for you—let the horses graze an area really short, or even (*if you are trying to destroy an existing plant community*) let them break it up with their hooves. Put your horses on the area right after you put the seed down. For a day or two you can feed hay in different areas to encourage the horses to walk all over the pasture. This is an easy way to make sure that the seed gets pressed into the soil. It will also improve germination.

VERY IMPORTANT: Don't leave the horse in there longer than one or two days, and be your own judge—if they are making a muddy mess, take them out. Mulch the area with straw to help keep moisture in and protect the area from erosion. If there is no rainfall while the seed is germinating and the plants are getting established, you will need

to irrigate—use a lawn sprinkler, or just hose it down in the morning. Give a good thorough soaking. Inadequate water can be worse than none at all, because it tricks the plant out of using its natural drought survival tactics. You will need to keep the animals off of the pasture until the grass grows at least 8 inches tall so that it will be stabilized by lots of root growth. Mow a few times before grazing to encourage plant tillering.

Creating A Sacrifice Area

It sounds like the last thing you would want on your farm: **a sacrifice area**. The multiple references to sacrifice areas in this publication highlight the value and importance of this tool. While you may picture a muddy patch outside a run-in shed, in reality, with some planning and improvements, a sacrifice area can be the go-to place for your horses year-round.

Sacrifice areas can be used any time that pastures are not the most appropriate place for your horses. Most commonly, they are used to control pasture intake during transitions to grazing from confinement feeding during muddy or wet times of the year or season, to allow adequate pasture plant regrowth in dry seasons, when animal numbers cannot be fully supported by the available acreage of pasture.

Using information from *Seeking Balance* as your guide, you are ready to manage horse grazing. For more assistance, check the resources on the back page.



This sacrifice area at UVM's Ellen A. Hardacre Equine Facility was renovated to provide drainage and handle its high hoof traffic. Read more about the process in *Greener Pastures*.

Resources

Improving Horse Pasture Management:

VT Pasture Network/VT Pasture Program at the UVM Center for Sustainable Agriculture

<http://www.uvm.edu/pasture>

UVM Equine Program:

<http://asci.uvm.edu/equine/publications.pdf>

Greene, E.A. Article on renovating high traffic areas:

<http://www.joe.org/joe/2007december/tt7.php>

UVM Plant & Soil Science:

Pasture improvement:

<http://pss.uvm.edu/vtcrops/?Page=pasturegrazing.html>

Soil testing:

http://pss.uvm.edu/ag_testing/

UVM Extension State Office:

<http://www.uvm.edu/extension>

800-571-0668 (Toll Free in Vermont) or 802-656-2990

Other Useful Sites:

Dairy One forage testing lab

<http://www.dairyone.com>

Five steps to a great horse pasture, from Fairfax, Virginia:

<http://www.fairfaxcounty.gov/nvswcd/newsletter/horsepasture.htm>

The Northeast Grazing Guide (hosted by University of Maine)

<http://www.umaine.edu/grazingguide>

From Rutgers University:

<http://www.rcre.rutgers.edu/horsepastures>

King Conservation District Publications website (particularly the mud management, pastures, general livestock, waste management and soil links):

<http://kingcd.org/pub.htm>

Contact:

Dr. Betsy Greene

Extension Equine Specialist
Department of Animal Science

204 Terrill Hall

570 Main Street

Burlington, VT 05405-0148

802-656-2108

Betsy.Greene@uvm.edu

Dr. Rachel Gilker

Pasture Program Coordinator
Center for Sustainable Agriculture

University of Vermont

106 Highpoint Center, Suite 300

Colchester, VT 05446

802-656-3834

Rachel.Gilker@uvm.edu

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