

Mountains-To-Bay Grazing Alliance

October 2021



PHOTO: REBECCA LONG

Fall Management for Pastures: Renovate or Restore?

by Mena Hautau, Former Educator, Field Crop Systems, Penn State University

Many pastures are just in need of some “restoration.” Examples of restoration include fertilization, liming, weed control, and improving the movement of animals through the pasture to control grass height. Often, restoration can be applied and bring pastures back to productivity.

Soil Management

Soil testing is a tool that is underutilized by many pasture managers. Testing can help us understand how the soil resource is performing and where to make the next soil management decision.

For example, a soil test may reveal acidic conditions that are preventing plants from adequately accessing the nutrients being supplied by manure. In this case, the use of lime is justified to increase the utilization of manures by plants.

In addition to the fertility measures included in a basic soil test, pasture managers also may want to test for organic matter content, which influences a soil’s biological activity, porosity, and ability to hold nutrients.

Pasture managers can monitor the change in organic matter over time by regularly measuring it as part of their soil-testing routine.

Weed Management

Weed management is directly tied to soil fertility. Weed problems in pastures are often the result of overabundant or insufficient soil nutrients or improper pH that affects nutrient availability.

If grass cannot grow due to inadequate nutrients, then weeds will be more competitive than the grass. Overabundant nutrients can cause weeds to grow very vigorously.

Using herbicides in pastures is mostly justified where we need spot treatment and should be part of an integrated approach—not the sole answer to weed control.

Movement of Animals

Animal movement through pastures has a tremendous effect on pasture growth and weeds.

In southeast Pennsylvania, the largest barrier to pasture productivity is animal overstocking. Farms tend to overstock due to the high land values and cost of farming. Other regions of the state have a tremendous opportunity to utilize more grass acres.

Overgrazing or “continuous grazing” prevents abundant grass growth. If individual grass

plants cannot regenerate leaves, they lose vigor, die out of the pastures, and are replaced by weeds.

Farms that are overstocked need to use a rotational or managed grazing system. A grazing system requires more subdivisions or paddocks which animals are moved through in order to prevent overgrazing. Animals are removed from a paddock when grass heights are no shorter than 3 to 4 inches.

Often, a sacrifice lot is needed. A sacrifice lot is a paddock where animals are moved to when pastures can no longer grow. The sacrifice lot allows animals to be kept off the pastures until the grass regrows. Although this measure requires stored feeds to be used, it will result in greater grass production (more tons of dry matter).

Farms that are understocked have more options. Usually those farms can use rotational/managed grazing and make stored feed (hay, baleage, or stockpile) with the excess growth.

Renovation Comes with Risks and Rewards

Renovation is defined as the complete destruction of and subsequent

(article continues on next page)

(article continued from previous page)

reestablishment of a pasture. This is best done when the pasture has been severely overgrazed and most of the grass has been lost.

Usually, weed growth is dominant (i.e., 40% or less of grass in the pasture), and the weeds present are aggressive and not considered by animals to be palatable.

An evaluation tool that can be used by managers to evaluate the need for renovation is a Pasture Condition Score, developed by the USDA-NRCS to help assess the quality of the pasture.

Renovation should not be taken lightly. It is costly in terms of inputs, labor, and time (including the time loss of those acres for production).

The overall goal should be to rapidly establish a seeding with minimal weed competition. The following suggestions are all techniques to arrive at this goal:

Seed in the early fall months. Soils will be warmer than in the spring, which results in rapid germination and crowding out of weed growth.

Soil fertility testing is best done several months in advance in order to make decisions and gather inputs. If the pH is adequate, a producer could consider using no-till to establish the grass, assuming they have access to a no-till seeder. If the pH is very low (below pH 6), consider using tillage. Tillage will mix the lime throughout the soil.

Make the decision regarding tillage or no-tillage based on access to equipment or a custom applicator. Modern no-till seeders do an excellent job and are becoming more commonly available.

If no-till is being used, kill the existing pasture with glyphosate ahead of the seeding date. Check seeding depth required by your seed mixture. Make sure the seed is being dropped into the soil, not the killed thatch layer.

If using conventional tillage, make sure the seedbed is properly established. Prepare the seed bed so that it is firm. Your foot should leave an imprint on the soil surface.



PHOTO COURTESY OF PENN STATE

The pasture plants to be seeded need to be matched to the soil type to ensure plant survival over time.

Seed mixtures have become more diverse and can include grasses and legumes. Managers should research what seed mixtures or combinations would work best for their site.

New research indicates that a diverse pasture mixture (i.e. 6 species) can help with reducing weed competition more than a single monoculture can.

Once your pasture is germinated and growing, the new plants need time to develop strong roots. Grow the pasture to flowering height, mow, and bale, cutting as high as possible. Allow the pasture to regrow and then allow animals to graze.

After establishment comes ongoing pasture maintenance.

Restoration and renovation are two approaches to maintaining a dynamic ecosystem that is constantly changing based on factors such as weather, grass height management, and fertility. Your goal should be to maintain a robust grass ecosystem that supports healthy productive animals with quality feed.

Summary of a Comparison Between Pasture Restoration and Renovation

Restoration

Soil testing to identify fertility and pH; inputs applied as recommended. Build organic matter over time.

Use of rotational or managed grazing to maintain grass height. Grass height no

shorter than 3-4 inches. Use of sacrifice lot if overstocked.

Work with existing plant diversity present in the pasture. Emphasize pasture management to keep grass and legumes competitive.

Use of frost seeding to introduce legumes into pasture. May seed bare spots. Overseeding is difficult in competitive pastures.

Weed control is integrated. Spot treatments with herbicides for aggressive weeds such as horse nettle or Canadian thistle. Keep up fertility. Periodic mowing if lots of seed set by weeds.

Renovation

Soil testing taken in advance to adequately address fertility BEFORE seeding.

New grass just established needs to grow to a height where it can be taken for hay and then can be grazed. Maintain grass height as in "renovation."

More emphasis on new seeds. Match species to site. Complex seed mixtures help with preventing weed establishment. Use of no-till or tillage to establish pastures is based on availability of equipment. Custom operators can be hired to do seeding and will do a superior job than do-it-yourself.

Weeds are best managed by controlling aggressive weeds before seeding, planting in fall, good grass stand establishment to crowd out weeds. Mowing and herbicides are not used until after plants are established.

Resource

[Guide to Pasture Conditioning Scoring Website, USDA-NRCS](#)

Business and Financial Training for Farmers

During fall 2021 and winter 2022, Food Animal Concerns Trust (FACT) will offer financial training for livestock and poultry farmers to help their farm businesses thrive.

FACT will partner with the Food Finance Institute (FFI) based out of the University of Wisconsin, Madison to provide three levels of programming: free webinars, subscriptions to on-demand online courses, and a Boot Camp intensive workshop.

FACT will provide a limited number of one-year subscriptions to FFI's Edible-Alpha digital resource hub (\$300 value) which offers both live and on-demand courses and educational content.

20 farms will be selected to participate in a four-day intensive Boot Camp (\$500 value) led by FFI experts and hosted by FACT. The immersive boot camp training arms farmers and ranchers with the knowledge and skills they need to profitably grow their business and raise money.

The Boot Camp will be held virtually and applicants may choose from two sessions: Session 1: December 7-8, 2021 and January 11-12, 2022; and Session 2: February 1-2 and March 1-2, 2022

The Boot Camp experience includes direct, live instruction and personalized coaching and consultation services.

FACT is currently accepting applications for on-demand subscriptions and Boot Camp through October 31.

For more information and to apply, visit foodanimalconcernstrust.org/financial-training.

Honey Locust: King of Stockpiles

by Austin Unruh, Crow and Berry Land Management

Do you know how much forage you have stockpiled for this winter?

What would you do with 2,000 extra pounds of high-energy, self-harvested feed per acre? What about 4,000 pounds? What would that do to your feed bill? How would that change your bottom line?

When the first snow of the season has fallen in my area, forage growth has all but ground to a halt, and all that's left to feed is whatever hay and standing forages were stockpiled.

While a tremendous amount has been learned about stockpiling forages over the past decades, we may have completely neglected a game-changing source of winter feed: Trees! (Didn't see that one coming, did you?)

While cool-season grasses do their best work in the spring, fall is the time when trees really shine. Fall is what trees work toward all year long, converting sunlight into seed for the next generation.

Some trees, like elm or maple, are stingy about their seeds, encapsulating them in dry, papery husks. Yet other trees will gladly partner with large herbivores, packaging their seed in large, sweet, high-energy fruits and pods, a perfect treat for anything from deer to Holsteins. That's true in the case of Honeycrisp apples and it's true in the case of honey locust trees.

When I talk honey locust, I'm talking about selected, quality-genetic, thornless, high-yielding, high-energy-pod-producing honey locusts.

If you're only familiar with the thorny wild trees that yield dry, leathery pods, I'm sorry. It's like someone who understandably hates burgers, because all they've ever been served are boiled soy-burgers. Once they taste a bacon-topped medium-rare half-pound grass-finished flame-broiled beauty, they're hooked for life.

(article continues on next page)



PHOTO: AUSTIN UNRUH

(article continued from previous page)

Good honey locusts might as well have been custom-made to complement grazing. One would be hard-pressed to come up with a better tree.

Let's start with shade. Of course, every tree provides shade. But if the tree is to work seamlessly in a grazing system, the shade needs to be just right. Not too much, and not too little. It needs to move throughout the course of the day, so that the livestock standing in that shade move as well.

The canopy should allow plenty of light through to still hit the forages beneath. Leaves should be small so they fall through the grass and decompose, rather than smothering forages. And the tree would ideally leaf out late in the spring and drop leaves early, so it casts shade only when most needed, namely during the heat of the summer. Honey locust checks all the boxes.

Next, let's look at how a honey locust boosts fertility around it. Think of a honey locust (or black locust, or alder) as one big over-sized clover, taking nitrogen from the atmosphere and pumping it into the soil.

Of course, all these plants do so initially for their own use, but through sloughing off roots and leaves, that nitrogen then becomes available to plants around them.

And nitrogen isn't all, since trees of all kinds have especially deep roots that pull up all types of nutrients that are otherwise inaccessible, then deposit them in upper soil horizons through leaf-drop.

I've saved the best for last. Where honey locust truly shines, more than any other tree in North America, is its ability to increase the winter stockpile of feed.

A good honey locust will have pods that are over a foot long, their insides plump with high-energy sugars.

Those nutritious, calorie-dense pods then drop just as forage production is slowing down and livestock are putting on weight for the winter.

October through December can see manna falling from heaven, and this manna will remain preserved on the ground for months



A nutritional analysis showed the following sugar content. From top pods to bottom: 19%, 29%, 37%

into winter for self-harvesting by cattle and sheep, hogs and horses.

It's not uncommon for a mature tree to yield 200 pounds of pods in a season, and 20-30 such trees could be fit in an acre and still allow plenty of sunlight through their dappled canopies.

Nutritionally, their pods are often compared to oats, so just picture what 4,000 pounds of oats coming from an acre of pasture could do for your ability to feed stockpile through the winter.

Before you reach for a tree catalogue to buy up a dozen (or thousand) of these trees, know that genetics matter a lot.

You don't raise bison for milk or bighorn sheep for wool, and you don't plant wild honey locust for a high-yielding silvopasture.

You also can't expect most honey locust from a standard nursery to yield the kind of pods you want. Most honey locust have been selected for use in city parks and parking lots, where their pods would be a nuisance. They've been carefully selected, but not for what you want. Planting them in pastures would be like raising Angus for their milk, or Katahdins for their wool.

What you want are trees that yield big, high-energy pods, and drop heavy crops for a century.

There are a few permaculture-inspired groups selling a handful of improved seedlings here and there, but not at large quantities.

Not yet, that is.

I am fortunate enough to live just a few miles from perhaps the best honey locust grove in the country, a grove planted nearly a century ago by John Hershey, a pioneer of two-story agriculture and major advocate of planting trees for livestock feed.

Hershey, as head of the Tree Crops division of the Depression-era Tennessee Valley Authority, set up contests whereby farmers would submit their best honey locust, persimmons, acorns, etc., thereby crowdsourcing the best genetics known to man.

The best honey locust cultivars today (Millwood, Calhoun, Hershey) were found in those contests. Hershey later brought those cultivars to his nursery where he propagated them.

While many of the old trees have been cut down as his farm was split into suburban lots, many of the honey locust still stand, yielding heavy loads of sweet pods.

If you're interested in seedlings from the best honey locust parents, sign up for my newsletter at treesforgraziers.com.

I have collected seed from these John Hershey trees, and will be growing out batches of trees in 2021 and beyond, making sure people can get access to the best honey locust genetics out there.

To read more about the John Hershey nursery, [click here](#).

Double (Yes, Double) Your Feed Production

by Austin Unruh, Crow and Berry Land Management

If you've read my previous article on honey locust, you know it is a game-changing source of winter stockpiled feed. Throughout most of the United States, there is no better tree to add feed to a farm during those critical winter months.

My goal in this article is to explore in greater depth the nutritional value of honey locust pods and just how much feed they can add to your stockpile.

Before we get started though, let's be clear: your results will vary. Whether you're on rocky soils in New York or a well-drained valley bottom in Georgia or a windy knob in Kansas will play a big factor in the yields you get. Sorry, but if you're on a hill in Vermont, you'll never get the pod yield a grazer on Mississippi bottomland can expect. So adjust your expectations accordingly.

Let's start by establishing the forage yield on this model farm.

I'll use the [hay yield data from 2019 in Virginia](#) (a state where honey locust grows well and has been well studied).

The data shows average hay yields of 2.2 tons per acre. Let's assume good management and round that number up to 2.5 tons per acre, or 5,000 pounds per acre as feed. Assuming 18% moisture in the hay, that turns into 4,100 pounds of dry matter.

Now on to the honey locust pods. For the sake of this calculation, we'll use 100 pounds per tree per year as a nice round number. I have commonly seen trees, both wild and from selected stock, produce well over 300 pounds in a given year.

However, honey locusts have a masting tendency, where they'll yield heavy one year and lightly the next. So, years need evened out.

Thankfully, honey locusts don't sync up like oaks (where all the oaks in the forest yield heavy or light the same years). Therefore, a diverse selection of honey locusts will balance each other out.

[Here is a paper](#) reporting the yield from a grove of grafted honey locust at Auburn University (way back in 1947). The average

yield for the grafted Millwood variety at ages 9-10 was 43.5 kilograms or 95.7 pounds.

Being grafted trees, that yield will be on the high end for young trees, but they are very young trees. Unfortunately, we don't have data on how those trees yielded at ages 20 or 50 or 80. So we'll use the round number of 100 pounds per tree per year.

Depending on your conditions, the care you give the trees, genetics, and the maturity of the trees, you could get much less or much more than this number.

Next, how many trees will this acre have? There is no perfect number of trees to establish, since there are always tradeoffs.

Plant 200 trees per acre and you'll quickly get to ideal shade levels and good pod production. However, the cost of establishing 200 high-quality trees on an acre is probably too high for consideration, given the fact you'll need to start thinning them within ten years or so.

On the other side of the spectrum, just 10 trees per acre will cost less to establish, but will take a generation to reach more ideal shade conditions, and two or three generations before the pod yields equal that of a more densely planted acre.

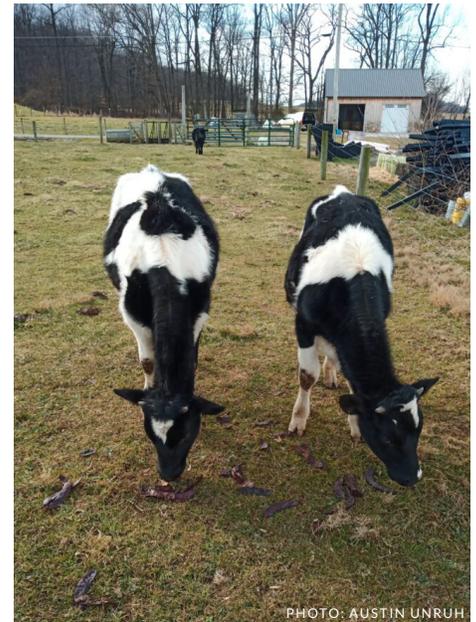
For this calculation, we'll go somewhere in the middle with a spacing of 30 feet by 40 feet, giving us 36 trees per acre.

Together, the 36 trees per acre and 100 pounds of pods per tree get us to a yield of 3,600 pounds per acre. That's quite the yield boost when it's an addition to the 5,000 pounds per acre of forages.

Will forage growth be reduced? Potentially, though that'll depend on many factors, like your forage type, aspect of your pasture, climate, etc.

Cool-season forages will love the dappled shade of the honey locust and do better in summer than if they were baking in the hot July sun.

Honey locust tends to leaf out later than many species, so it allows more sunlight to reach forages in early spring.



One taste of the sweet pulp and these steers were sold on honey locust.

A likely outcome of adding nice dappled shade trees to pastures at low densities (we're not talking a forest here) is a slight reduction of forage mass in the spring and fall, but stronger growth into the hot months when growth would otherwise slump. And a good fodder tree will more than make up for any yield decline by dropping pods.

We would be missing out on some key insight if we only looked at the pounds yielded by forages and pods.

Saying those two feeds are the same would be like equating a glass of skim milk to a glass of whole milk.

The big difference is that a pound of honey locust pods is much more energy dense than a pound of hay. So for the sake of a more nuanced comparison, let's look at the caloric energy each feed breaks down to.

Let's start with the hay. At roughly 950 calories per pound of hay DM, we're looking at the pasture producing 3,895,000 calories in forages per acre per year.

Now, let's look at what kind of caloric yield comes from those 3,600 pounds of pods.

The pods (containing 29% sugar) analyzed for [Feedipedia](#) contained 18.3 megajoules per kilogram on a DM basis. Translate that to calories per pound for pods, and you get 1,981 calories per pound.

(article continues on next page)

(article continued from previous page)

Let's assume that the 100 pounds of honey locust pods dropped from our 36 trees contained 35% moisture, so that each tree yielded 65 pounds of actual dry matter.

That yields 128,765 calories per tree, or 4,635,540 calories per acre. This represents a huge increase in feed, all without adding another square foot of land.

It more than doubles the feed yielded per acre, plus shade and all the weight gain benefits that come from that, plus a more diverse and resilient ecosystem, plus a great public relations campaign!

Now this is a simplistic model as we've already stated. In reality I don't want people to go create honey locust monocultures. There are a ton of other trees with good practical value in a pasture.

Persimmons will drop feed like honey locusts do (dropping fruit from August through January or later depending on variety). If you can grow honey locust, you can grow persimmon.

Oaks are another that graziers have used, and burr oaks will bear acorns almost the size of a golf ball.

Then you have all kinds of trees that may not drop a mast crop, but will provide other services, like nitrogen fixation (black locusts, alder, mimosa), windbreak (evergreens and



We're not talking garnish here. This bag held 250 pounds of pods, and was only a third of the pods from a single champion honey locust tree.

any densely planted deciduous trees), leaf fodder as a supplement (mulberry, hybrid poplar, willow).

If you're reading this, I can be confident you recognize the value of a polyculture. But there's nothing that beats a good honey locust for silvopasture.

This is a snapshot of honey locust in its infancy. There has been almost zero breeding work done on this tree, a tree that already can outyield what corn produced until the Green Revolution (average per acre corn yields in the U.S. were around 30 bushels per acre, or a mere 2.6 million calories per acre, until 1935).

Why hasn't more work been done? A lack of patience and long-term vision. Several

breeding efforts were started along the way, but most were abandoned when leadership changed or newer, shinier, better-funded opportunities (like corn and soybean research) appeared.

Today, however, is a different day. The spell and allure of industrial monocropping is starting to break down, and there's a growing push to perennialize agriculture and store carbon in the soil where it belongs.

You are part of that wave, creating the conditions for healthier food, deeper soil, and stable communities. In our societal push to plow hedgerow to hedgerow, we neglected the grasses and trees that form the basis of good stewardship. They should be neglected no longer.

#GrazedToPerfection Campaign Launches

Future Harvest strives to promote food-purchasing decisions that are good for you, good for the planet, and good for farmers.

On top of shopping for fresh, seasonal vegetables and fruit at the farmers markets, we believe that animals raised on pasture play a critically important role in agricultural land management, the nutrient cycle, and a sustainable food system.

If we can shift the consumer demand away from mass-produced meats and towards quality, pasture-raised products sourced locally, and consumed mindfully, we can build a resilient and healthy foodshed—for farmers, eaters, animals, and soils.

Our [Go Grassfed website](#) is full of resources for farmers and consumers that support this mission:

[Amazing Grazing Directory Map](#). Where consumers can find a grass-based farmer close to home.

[Go Grassfed: The Film](#). A dive into the benefits of pasture-raised animal products featuring regional farmers, chefs, and more. A great video for sharing to social media for farmers to boost awareness and sales.

[Buying Club Toolkits](#). Resources aggregated for farmers and for consumers to facilitate bulk purchases.

[Why Grassfed?](#) A simple explanation of the benefits of going grassfed.

[Recipes](#). Tips for cooking grassfed meats.

We want everyone to know why grassfed meat—#GrazedToPerfection—is good for you, good for the planet, and good for farmers and animals. By choosing quality, grassfed meats, you're not only ensuring the most delicious, best-tasting meals, but also contributing to the health and resilience of our regional food and farm systems.

Visit gograssfed.org now to learn more about the benefits of pasture-raised meats and connect with a grass-based farmer near you.

Frost Can Cause Forage Hazards

by Amanda Grev, University of Maryland Extension

With the first freeze of the fall just around the corner, remember that a frost can result in potential hazards for certain forages.

When a plant freezes, changes occur in its metabolism and composition that can cause toxicity issues for livestock. A few issues to be on the lookout for are discussed below.

Prussic Acid Poisoning

Sorghum species like sorghum, sudangrass, sorghum-sudangrass hybrids, and johnsongrass contain a cyanogenic compound called dhurrin within the plant. Under normal circumstances, the dhurrin is bound within plant tissues and remains non-toxic.

However, if the plant tissue is injured by some sort of stressor such as a frost, the plant cell membranes can become damaged. This damage releases enzymes that can break down the dhurrin, resulting in the formation of a highly toxic hydrogen cyanide compound commonly referred to as prussic acid.

Prussic acid hinders the animal's ability to transfer oxygen in the blood stream, resulting in asphyxiation. Ruminant animals are most susceptible, with a prussic acid concentration as small as 0.1% of dry tissue considered dangerous.

Symptoms of prussic acid poisoning can appear within minutes following ingestion, with common symptoms including excessive salivation, difficulty breathing, staggering, convulsions, and collapsing.

The greatest levels of prussic acid can be found in the leafier parts of the plant, particularly in new growth, and young, growing plants contain more prussic acid than older plants.

To prevent prussic acid poisoning, follow these recommendations for grazing or harvesting frosted forages.

Grazing: Do not graze sorghum species on nights when a frost is likely, as high levels of the toxic compounds are produced within hours following a frost.

After a killing frost, wait at least 7 to 10 days before grazing or green chopping forage, as prussic acid levels are highest in plant leaves



PHOTO: ALSTON HORN

and do not begin to decline until after the leaves have dried.

After a non-killing frost, do not allow livestock to graze until the regrowth has reached a minimum of two feet in height or two weeks have passed, as the regrowth will likely contain high levels of prussic acid.

When returning to grazing, don't turn animals in hungry and use a heavier stocking rate and rotational grazing to reduce the risk of animals selectively grazing leaves or young growth that may still have higher concentrations of prussic acid present.

Harvesting: Proper field curing or ensiling can help reduce the potential for toxicity in harvested forages because prussic acid is volatile and some of the toxic components will dissipate as a gas during the drying or fermentation process.

Forages should be ensiled for a minimum of eight weeks if there was a risk of high prussic acid levels at the time of chopping.

The prussic acid content in hay can be reduced by as much as 75% during the curing process, so hay is typically not hazardous when fed to livestock.

Forages can also be analyzed prior to feeding to ensure the toxic compounds have been reduced to a safe level for consumption.

Nitrate Toxicity

Sorghum species, along with several other species including millet, brassicas, oats, and

other small grains, are susceptible to nitrate accumulation.

Under normal growing conditions, nitrate from the soil is absorbed by the roots of forage plants and is supplied to the upper portions of the plant, where it is converted into plant protein.

However, under adverse environmental conditions such as drought, frost, or sudden weather changes, plant growth ceases and metabolism slows but the plants continue to take up nitrogen from the soil, resulting in a buildup of nitrates within the plant.

Nitrate levels will remain high until there is new leaf growth, which increases photosynthesis and provides energy to utilize the excess nitrate.

When livestock consume forages with normal nitrate levels, the nitrate is broken down by rumen microbes to nitrite and then further to ammonia, which is converted to protein.

With high-nitrate forages, nitrites accumulate faster than they can be converted to ammonia, and the accumulated nitrite is absorbed into the bloodstream. Nitrite combines with hemoglobin to produce methemoglobin, which is incapable of transporting oxygen, ultimately leading to asphyxiation.

Symptoms of nitrate toxicity are related to a lack of oxygen in the blood and include

(article continues on next page)

(article continued from previous page)

weakness, difficulty breathing, rapid heartbeat, staggering, muscle tremors, and inability to stand.

Affected animals typically show signs of poisoning within a few hours after consumption and ruminant animals are most susceptible due to the rapid conversion of nitrate to nitrite by rumen microorganisms.

Nitrate levels are typically measured as nitrate nitrogen (NO₃-N) on a parts per million (ppm) basis.

Levels under 550 ppm NO₃-N are typically considered safe to feed for all classes of livestock.

Levels between 550 and 1100 ppm NO₃-N may cause problems in pregnant and young animals, and levels between 1100 and 2200 ppm NO₃-N are typically considered toxic and should be fed with caution.

Levels above 2200 ppm NO₃-N are likely unsafe to feed.

Unlike prussic acid, which accumulates in the leafiest portion of the plant, nitrates tend to accumulate in the lower portion of the stem and stalks.

To prevent nitrate poisoning, follow these recommendations for grazing or harvesting frosted forages.

Grazing: Avoid grazing susceptible forages when growth ceases due to drought, frost damage, or other adverse conditions.

When grazing forages with suspected nitrate

accumulation, introduce and acclimate livestock gradually.

Feeding a low-nitrate forage or hay prior to turning livestock out onto high-nitrate forages will reduce the amount of nitrate consumed; avoid turning hungry livestock out onto a high-nitrate field.

Graze high-nitrate forages in the afternoon when nitrate levels tend to be the lowest, and stock lightly so animals can selectively graze the leaves which are lower in nitrate concentration.

Harvesting: Delaying harvest until stress conditions have passed will help to lower nitrate levels within the forage and prevent toxicity.

Because nitrates accumulate in the base of the plant, risk can also be reduced by cutting higher and leaving more stubble. The ensiling process can reduce nitrate concentrations by 30 to 60% following complete fermentation due to microbial degradation.

However, nitrate concentrations are stable in cured hay so use caution if the forage must be baled and leave at least 12 inches of stubble to avoid baling the most toxic part of the plant.

Like with prussic acid, forages can be analyzed for nitrate concentrations prior to feeding.

If forages are known to have higher than ideal nitrate levels, diluting the forage by incorporating a low-nitrate forage into the diet will reduce the overall nitrate consumption by the animal.

Introducing the toxic forage slowly will

help animals adapt, as well as feeding small amounts frequently rather than one large feeding.

Increasing the energy content in the ration by offering a grain or high-carbohydrate feed can also help by enhancing metabolism in the rumen and aiding in the conversion of nitrates to protein, helping livestock to better tolerate higher nitrate levels in their diet.

Bloat Potential

Frothy bloat is the most common type of pasture bloat and results from the formation of a stable foam in the rumen that minimizes the animal's ability to expel rumen gases.

Consumption of forages containing high levels of soluble protein, such as alfalfa and clover, can contribute to stable foam production.

Livestock suffering from bloat may indicate discomfort by stomping their feet or kicking at their belly. They will appear distended on the left side, and may die within hours.

Following a frost, plant cells rupture, producing small plant cell wall fragments and increasing the amount of potassium, calcium, and magnesium present, all of which can increase the risk of bloat.

Be aware that forage with bloat potential can be more likely to cause bloat for a few days following a frost event.

If grazing pastures with high concentrations of bloat-inducing species like alfalfa or clover, waiting a few days to a week following a hard frost is a good management practice to reduce the risk of bloat.

PHOTO: LAURA MCKENZIE



Grazing Cattle Can Reduce Agriculture's Carbon Footprint

by Adam Russell, Texas A&M AgriLife Communications

Ruminant animals like cattle contribute to the maintenance of healthy soils and grasslands, and proper grazing management can reduce the industry's carbon emissions and overall footprint, according to a Texas A&M AgriLife Research scientist.

Richard Teague, professor emeritus in the Department Rangeland, Wildlife, and Fisheries Management and senior scientist of the Norman Borlaug Institute for International Agriculture and the Texas A&M AgriLife Research and Extension Center at Vernon, said [his research](#), published in the Soil and Water Conservation Society's Journal of Soil and Water Conservation, presents sustainable solutions for grazing agriculture.

The published article, authored by Teague with co-authors who include Urs Kreuter, AgriLife Research socio-economist in the Texas A&M College of Agriculture and Life Sciences Department of Ecology and Conservation Biology, was recognized at the society's recent conference as a Soil and Water Conservation Society Research Paper for Impact and Quality.

Teague's research shows appropriate grazing management practices in cattle production are among the solutions for concerns related to agriculture's impact on the environment.

His article serves as a call to action for the implementation of agricultural practices that can improve the resource base, environment, productivity, and economic returns.

"We went to the society because it represents professionals who know soils, and to have it published and then recognized by them is huge and shows the validity of the work," he said. "I am extremely proud of the work and my fellow contributors at Texas A&M and around the country. And I believe it to be a good example for how science can present solutions to serious issues related to agricultural production."

Ruminants As Part Of The Solution

To ensure long-term sustainability and ecological resilience of agricultural landscapes, he said cropping and grazing management protocols are needed that can regenerate soil systems and ecosystem functions previously lost by neglect and

destructive management practices.

Fortunately, many problems caused by some current cropping and grazing agriculture practices can be avoided by ecologically sensitive management of ruminants in mixed crop and grazing agroecosystems.

Effective soil management measures provide the most significant possibilities for achieving sustainable use of agricultural land amid a changing and increasingly variable climate, Teague said.

Regenerative agricultural practices restore soil health and ecosystem function to support ecologically healthy and resilient agroecosystems. These practices improve net profitability and enhance ecosystem and watershed function.

Reducing Carbon Footprint With Ruminants, Regeneration

Grassland ecosystems co-evolved with herbivores over many thousands of years as complex, dynamic ecosystems comprised of grasses, soil biota, graziers, and predators that deteriorate in the absence of periodic grazing, Teague said. His research suggests moving toward regenerative practices designed to improve soil biology and function.

Ruminant livestock are an important tool for achieving sustainable agriculture with appropriate grazing management, Teague said.

A key element is that grazing cattle on permanent perennial grasslands with appropriate management helps develop soil biology to improve soil carbon, rainfall infiltration, and soil fertility.

Thus, much more carbon dioxide equivalents are sequestered into the soil than are emitted by cattle in that management unit, Teague said.

Such management increases the production of forages, allowing for more livestock to provide improved economic returns compared to conventional methods.

Permanent cover of forage plants is highly effective in reducing soil erosion and increasing soil infiltration, and ruminants

consuming grazed forages under appropriate management results in considerably more carbon sequestration than emissions, Teague said.

Incorporating forages with ruminants to manage regeneration of ecological function in agro-ecosystems can elevate soil carbon, improve soil ecological function, and enhance biodiversity and wildlife habitat if incorporated within goal-oriented planning and monitoring protocols.

"In non-cropping and cropping areas, grazing ruminants in a manner that enhances soil health reduces the carbon footprint of agriculture much more than by reducing ruminant numbers and provides highly nutritious food that has sustained pastoral livelihoods and cultures for centuries," he said.

Regenerative Ag Practices For Future Prosperity

Teague said research can cause more harm to public discourse related to sustainable agriculture unless scientists take a much broader view of agriculture.

This broad view includes the potential societal and economic ramifications of proposed changes, but also warrants providing solutions that can be used in policy and ultimately in the evolution of more sustainable global food and fiber production.

"The scientific investigations that call for the reduction or elimination of cattle and livestock agricultural production must consider the full impacts of the entire food production chain, and of different cropping and livestock alternatives," Teague said.

Collectively, conservation agriculture aimed at regenerating soil health and ecosystem function supports ecologically healthy and resilient agroecosystems, improves net profitability, and enhances watershed function, Teague said.

"When we're talking about science, we need to look at the full spectrum of what is happening, weigh the positives and negatives of our options and be honest about the outcomes," he said. "Then, we seek the most sustainable solution."

Pasa Sustainable Agriculture Awarded Grant to Create Grassfed, Organic Dairy Supply Chain in Pennsylvania

The National Fish and Wildlife Foundation and the U.S. Environmental Protection Agency has awarded Pasa Sustainable Agriculture nearly \$1 million in grant funding to establish in southeastern Pennsylvania the first regenerative organic dairy supply chain in the United States.

By supporting managed grazing systems and implementing best management practices, the project contributes to broader ongoing efforts to restore and preserve the Chesapeake Bay watershed.

The project also responds to increasing demand and lucrative markets for grassfed organic milk, offering a more secure path toward financial viability for dairy farmers who continue to experience an historic market decline.

Pasa will work with project partners Center for Dairy Excellence, Ephrata National Bank, Mad Agriculture, ORIGIN Milk, Rodale Institute, and TeamAg to pioneer a model of 100% grassfed dairy farms that build healthy soils and improve water quality while collectively generating at least \$10 million in milk sales annually.

“The project team will work together with dairy farms transitioning to grass-fed organic milk production to make other updates on their farms that improve water quality, such as planting riparian forested buffers along

streams and improving barnyards,” said TeamAg Business Developer John Williamson.

The project additionally aims to convert 6,000 acres of cropland to managed grazing systems, and 4,000 acres of cropland to perennial hay.

With these moves toward more sustainable milk production methods, the project team expects to improve water quality in the Chesapeake Bay by reducing agricultural nitrogen runoff by more than 400,000 pounds per year, reducing phosphorus runoff by more than 9,000 pounds per year, and reducing sediment erosion by more than 23 million pounds per year.

Through farmer-to-farmer education, technical assistance, and business development support, the project team will help dairy farmers transition to or improve grazing practices and develop financially viable business models.

More than 50 dairies will be able to access production and environmental stewardship planning services through TeamAg, as well as business consulting services through the Center for Dairy Excellence.



We anticipate at least 40 eligible dairy farmers will be able to secure a five-year contract with ORIGIN Milk Company and a premium price for all-grass, regenerative-organic-certified milk at more than \$40/cwt.

Rodale Institute will provide support for dairy farms to become Regenerative Organic Certified, which is the highest international standard for soil health, animal welfare, and farmworker fairness.

Ephrata National Bank can provide financing to help farms transition to grazing. Mad Agriculture, based in Colorado, will provide a third-party assessment of the project.

“We hope this project will not only support healthier soil and cleaner water in the Chesapeake Bay, but also serve as a model for evolving the dairy industry regionally and nationally,” said Pasa Education Director Franklin Egan.

A Long-Term Relationship with the Land

by Jessica Matthews

Recently, Jessica Matthews—a graduate from Pasa Sustainable Agriculture’s Dairy Grazing Apprenticeship program—headed out to Maryland to visit Ariel Herrod, one of the participants in its new Transition to Grazing cohort.

They discussed the challenges of taking on a farming business, being women in agriculture, and belonging to the climate-change generation. They also talked about how the potential solutions to these challenges lie in connecting with other farmers and the land.

Jessica Matthews: How did you get into farming?

Ariel Herrod: Well, the story I tell people is...I feel like I was born a farmer. I grew up in the suburbs, but our house backed up to some woods. I spent a lot of time playing in those woods. I would come home with random berries, and I’d say, “Mom, can I eat this?” And sometimes she’d say, “Yeah! You can,” and sometimes she’d say, “No! Please don’t.” So there’s always been this interest in the natural world and, in particular, gaining sustenance from the natural world.

I reread this essay recently—“The Trouble with Wilderness,” by William Cronon—and he talks about the creation of wilderness as something that emerged out of the United

State’s ideology and political landscape, and that when we separate ourselves from the natural world, that can lead to environmental degradation.

Because, even if we say it’s sacred, it’s “over there”... it’s not relevant in our everyday life; we’re not part of it. That’s a central idea to me. That we should be in a constant relationship with the natural world—it all ties back to picking berries in the woods. I feel like that was just in me. That’s not something I learned. But I didn’t really know that farming was a job. I didn’t know any farmers.

(article continues on next page)

(article continued from previous page)

How did it become your career?

So many circuitous paths... It was probably as I was leaving high school and going to college, the concept of agriculture as a career and an industry had started to trickle into my head.

I double majored in environmental studies and geography at Macalester College in Saint Paul, Minnesota. I was interested in sustainable agriculture and international development.

But when I got the chance to study abroad in Bolivia, I felt like, who was I to tell people in other countries what they should do?

Then I got interested in environmental education for kids. That actually led to my first farm gig, working for Great Kids Farm, which was owned and operated by Baltimore City Public Schools.

Again though, the experience kind of made me think—who am I to teach these kids about farming? So when I graduated from college, I got a job on Easy Bean Farm, a veggie CSA in Milan, Minnesota, three hours west of the Twin Cities.

That summer was the first time I had actually lived in a rural farming community and I really liked aspects of the rural culture. So I decided to stick around.

I found a job with an environmental nonprofit in the area that worked on water quality issues, which in the Corn Belt, stem largely from agriculture.

And I finally decided what I really wanted to do was farm and prove that there was a way to have a viable business that also improved the land, water cycles, the air.

So I became an organic inspector, which is sort of funny, because, right off the bat, I was assigned a bunch of dairy clients, and I didn't know what mastitis was—I had to Google it! Something that is super common to any dairy farmer was just not on my radar.

But that's why inspecting was great, because I had to be in regular conversation with farmers who were committed to it as a business. I spent four years traveling around to farms and food processing facilities and



Ariel Herrod at Clear Spring Creamery in Washington County, Maryland.

getting this really fantastic opportunity to ask all sorts of questions—because it was my job!

And that's really where I picked up a lot of the background and the baseline knowledge about the trade. And now—I'm trying to actually do it!

Tell us about doing it for real.

Yeah, so when the opportunity came to work full-time at Clear Spring Creamery, especially with the possibility of a farm transition on the horizon, it seemed that it was time to let inspecting go.

Clear Spring is a grass-based dairy that's been in operation for more than a decade. It's 100% direct-market and we sell at four weekend farmers markets in the D.C. area.

Actually, the owners, Mark and Clare, knew they wanted to have a dairy, but they also specifically designed their farm around what the area farmers markets wanted.

They asked local market managers, "What do you need?" And the answer was fluid milk.

There are a lot of cheesemakers, but not that many folks doing fluid milk. So that became the foundation.

Milk and yogurt are the primary products, though we also make some cheese when we have excess milk.

They have always been spring-seasonal, so they were able to take the winter off—all the cows are dry, which really helps with quality of life.

How did the transition come about?

The farm was always Mark's dream. This is his family's land. The house we're in right now is where he grew up.

But gradually Clare realized she wanted to work on her dream. I was brought on full-time to ease her daily workload. They worked really hard to build the business, they'd like to see it continue in some form. And we're trying to figure out a way to make that happen.

What are the biggest challenges?

Well, I mean, yes, there's all the—can I afford this? Serious logistical and financial challenges. The thought of taking on a big business that has a lot of up-front expense, and knowing that that business is not as financially secure as getting paid a salary. That is hard to wrap my mind around.

And it brings up fear...though I'm trying to view it more as an interesting challenge.

What does your future look like?

I was talking to a friend who encouraged me to start making a list of non-negotiables. And then figure out if the situation you're looking at will get you there.

One non-negotiable is that I want to be in a place, and be able to stay in that place... and have the opportunity to really make a place my home. Plant long-live perennials, plant trees...

(article continues on next page)

(article continued from previous page)

Harvest some asparagus maybe...

Yes! So that's one of my non-negotiables—being able to put down some sort of roots. Be able to make an impact on a piece of land.

What are you hoping to get out of participating in the Transition to Grazing cohort?

Farming is almost monastic in its isolation, and, well that's maybe another non-negotiable. I refuse to be lonely for the rest of my life.

I really need peers. And I need other women. Not exclusively, but I need someone who knows what it's like to walk into a room full of men who've been doing this their whole life and try to be heard.

I need someone who's never driven a tractor and is sort of terrified of how loud it is.

But I also need someone who can look at my pastures with me and say, I get why

you're concerned, but I don't think you need to panic.

I need people that are going to problem solve with me. When I'm dealing with an emotionally charged decision that also requires a solid foundation in the reality of this industry—I need someone that can handle that.

I'm hearing that you're expecting fellowship. That was one of the things that was most important to me in my learning process, was to get connected with other people—including other women—and talking openly and honestly about good stuff and the challenges.

Right. Also, thinking about the future...See, I feel like my generation is the climate-change generation. We can't operate on a planting schedule anymore, because some of that stuff just isn't predictable. You have to go out in the field and take those measurements, because every year's going to be different.

As land managers, especially those of use that want to form a long-term relationship with

the land, we have an opportunity to start to restore some of those cycles. I would love to be able to do that.

That's why I want to be on a piece of land for a long time, I want to see those cycles improve.

I would love to be planting trees. And because I also love livestock, the thing that seems the best fit is silvopasture. Even better if those trees have some sort of commercial value as well.

And I certainly don't have the capacity to intensively manage a fruit or nut crop, but that's an opportunity for a partnership. Something that can happen within a larger community of farmers who are interested in trying the same ideas.

~~~~~

Interested in Pasa Sustainable Agriculture's Transition to Grazing Cohort program? Visit their website at [pasafarming.org](http://pasafarming.org) for more information.

## UPCOMING EVENTS

### Poultry Processing Education and Training Session

October 23, 9:00 a.m.-noon

The Carver Center

9432 N. James Madison Highway, Rapidan, VA

Attendees to this workshop will learn about the equipment necessary for poultry processing and about American Farmland Trust's low-cost portable processing equipment rental program. Register at [mvfpva.org/events](http://mvfpva.org/events).

### Grazing Strategies for Resilience and Profitability

October 27, 9:30 a.m.-1:00 p.m.

Pop's Old Place

4657 Skinners Run Road, Hurlock, MD

Walk some of the pastures with owner/operator Darlene Goehringer, UMES Extension small ruminant specialist Dr. E. Nelson Escobar, and UME pasture specialist Amanda Grev, to learn about the successes and challenges Darlene has encountered establishing her pasture-based operation. Registration costs \$10 for members and \$15 for non-members, and includes lunch. To register, visit [futureharvestcasa.org](http://futureharvestcasa.org).

### Maryland Beef Producers Short Course Series III: Pasture Development and Management

October 29: Boonsboro, MD

November 5: Waldorf, MD

November 1: Denton, MD

This one day workshop will cover various aspects of good pasture development and management in both a classroom style and hands-on outdoor environment. Registration costs \$35 and can be done online at [ansc.umd.edu/extension/beef-extension/educational-courses](http://ansc.umd.edu/extension/beef-extension/educational-courses).

### Beef Quality Assurance Training

October 30, 8:00-11:00 a.m.

Culpeper Agricultural Enterprises

10220 James Monroe Highway, Culpeper, VA

Learn proactive steps to raise beef responsibly. To register, visit [tinyurl.com/culpeperbeef](http://tinyurl.com/culpeperbeef).

### Grazing on Marginal Land

November 6, 1:00-3:00 p.m.

Spring Pastures Farm, Middletown, MD

At this field day, we'll do a walking farm tour, view and discuss the farmers' methods for converting previously continually grazed land, monocrop tilled land, and rocky and overgrown land into pastures, and participate

in a HayBeGone demo. \$10 for members, \$15 for non-members. Register by visiting [futureharvestcasa.org](http://futureharvestcasa.org).

### Lunch & Learn: Soil Health To Go!

November 10, 12:00-12:30 p.m.

Ready to learn more about how to take your pastures up a notch? Join us as we chat with pastured livestock producer, Sam White, of Leaning Pine Farm. To register, visit [futureharvestcasa.org](http://futureharvestcasa.org).

### Virginia Forage and Grassland Council

2022 Forage Conference

January 18: Wytheville, VA

January 19: Chatham, VA

January 20: Culpeper, VA

January 21: Weyers Cave, VA

This year's winter forage conference series will explore and challenge the common claim that beef is bad for the planet. From issues like water quality to climate change, our speakers will show how well-managed grasslands can produce healthy meat and be part of the solution to the environmental issues we face. Registration costs \$35, if received by January 4, or livestream for \$20. To register, visit [vaforages.org/event](http://vaforages.org/event).

# Mountains-to-Bay Grazing Alliance



Funding for this newsletter is provided by the U.S. Environmental Protection Agency, Natural Resources Conservation Service, and PA Department of Environmental Protection through the National Fish and Wildlife Foundation's Innovative Nutrient and Sediment Reduction program.

This material in this newsletter is based on work supported by the U.S. Environmental Protection Agency (Assistance Agreement No. C896358101) and the National Fish and Wildlife Foundation's Chesapeake Bay Stewardship Fund, which promotes community-based efforts to develop conservation strategies to protect and restore the diverse natural resources of the Chesapeake Bay.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government or the National Fish and Wildlife Foundation and its funding sources. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government, or the National Fish and Wildlife Foundation or its Funding sources.

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture, under number NR183A750022C004. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture. USDA is an equal opportunity provider and employer.