Mob Grazing
by Tom Chapman

The great herd on the Arkansas [River] through which I passed ……. was, from my own observation, not less than 25 miles wide, and from reports of hunters and others it was about five days in passing a given point, or not less than 50 miles deep. From the top of Pownee Rock I could see from 6 to 10 miles in almost every direction. This whole vast space was covered with buffalo, looking at a distance like one compact mass, the visual angle not permitting the ground to be seen. I have seen such a sight a great number of times, but never on so large a scale.

from “The Extermination of the American Bison” written by William T Hornaday in 1889.

The term ‘mob grazing’ means keeping large numbers of cattle on a small area of land and moving them frequently. The land then enjoys long periods of rest before the cattle return. It is mimicking how huge herds of wandering bison or wildebeest or caribou used to move through an area, trampling and grazing all around them before they departed, literally, for pastures new, leaving the grasses to grow, mature and reproduce once more.

Grass plants have evolved over millions of years under such grazing regimes and it is only during the past few hundred years that we have started using enclosures and fields, exposing the grasses to completely different grazing pressures, involving constant grazing and re-grazing of the immature plants. Grasses and other forage plants are poorly adapted to such treatments and consequently productivity is much reduced.

By emulating the huge herds of yesteryear, mob grazing encourages the grass plants to complete their full lifecycle, improving overall capture of sunlight and hence improving the land’s productivity. Additionally, mob grazed cattle trample significant quantities of forage onto the soil surface, feeding the microorganisms and other soil life and increasing the soil organic matter.

A happy side effect of allowing grasses to grow to maturity is that cattle are much healthier. They too have adapted to eat large amounts of bulky forage material with a good combination of fiber, protein and energy. The sheen on their coats and the firmness of their dung, coupled with the growth rates and overall health of their calves is testament to the benefits of mob grazing more mature pastures.

Incorporating cattle into an arable rotation offers real financial benefits. Soils become more fertile and, if the right mixture of forage is grown for grazing, significant savings in nitrogenous and other fertilizers can be made. The friability of soils also improves and both its water holding capacity (useful in a drought situation) and the rate of water infiltration (useful during periods of heavy rainfall) are greatly improved.

The bottom line is that cattle in the rotation can improve your bottom line! Profitability is enhanced and the environment is much improved too.

The basic premise of mob grazing is one of high stocking densities – huge numbers of cattle bunched into tight groups – which are moved frequently with the aid of electric fences, trampling into the soil as much forage as they graze. The pasture land is then left, untouched, until it is fully recovered, giving opportunities for a whole host of plant species, that would otherwise be grazed out or out-competed, to establish in the sward.

Mob grazing simulates the vast herds of bison that used to migrate across the American plains, or the millions of wildebeest that still sweep over the African savannah, or the famous European auroch herds that grazed their way across our own continent thousands of years ago.

The grass plant evolved alongside such migrations, adapting and specialising to a life cycle that included short, intense periods of grazing and trampling followed by long rest periods. I realised that it is only in the last few hundred years that grasses have been managed differently and that such management is detrimental to the long term productivity of our grasslands.

To understand exactly why mob grazing works, it is important to break down the process into its component parts. Firstly, the long recovery time between grazings allows the plant to establish a healthy root system. The roots grow deeper into the soil, bringing up hidden nutrients and making the plant more drought-hardy. Carbohydrates are also stored in the root and provide the energy vital to feed the new regrowth post-grazing. The long recovery time also leads to high volumes of above ground forage, a mixture of leaf, seed and stem.

(continued on page 2)
Grass Farming
by Jack Kittredge

One of my pet peeves is the assertion -- that I read so often in the writings of well-meaning but poorly informed people commenting on the food system -- that livestock production is wasteful of land, water and resources badly needed to feed people.

I know they have read some diatribe by a militant who could be fed on the amount of corn and soy being consumed by an American beef cow at a typical feedlot. Not only do they not question the healthfulness of feeding people on so much soy, nor the wisdom of exposing these imagined starving people to a diet of 100% GMOs engineered by Monsanto, they don’t even concede that the feeding of large amounts of grain to ruminants is unnatural, a product of modern industrial farming, and as much anathema to friends of livestock as to their opponents.

Grazing is the subject of this issue. We pick it because, properly done, it sequesters atmospheric carbon long-term, builds the productive capacity of soil, enables the storage of large amounts of water, and increases the number of people who can be healthily fed from the world’s landmass. It also is an important part of agriculture in our region.

Areas like the northeastern United States are well suited to grazing. Our rolling terrain often makes annual crop production difficult – use of machinery is limited by slopes and rocks, and tillage on hills can result in erosion. But perennial grasses are ideally suited to our generous precipitation while four-footed herbivores are well adapted to hills and rocks.

So in this issue we try to give state of the art information discussing grazing theory, grazing practice, and the sometimes counterintuitive thinking about responsible management which leads to grazing success. We hear from experts, experienced practitioners, and relative novices -- garnering their wisdom and information about raising grass for a living. We hope it helps you rethink your farming and buying decisions.

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The high stocking density means up to 50% of the plant is trampled to the ground by the animals. Cattle turned into a fully mature pasture graze the lash tops of the plants, eating seedheads and upper leaves full of energy and protein. The tougher, lower stems are trodden onto the soil surface and these stalks act both as a mulch and as a food source for the soil microorganisms, building new soil in the process.

The cattle only eat the best parts of the plant before being moved onto a new area of ground, and this is why performance doesn’t suffer -- they are not forced to eat the poorer stems et cetera – and their dung is tight and firm, reflecting the balanced diet they are getting.

As the organic matter rises and the soil becomes more fertile, the land grows more forage and stock- ing rates – the total carrying capacity of the land – increase. Neil Dennis, a Canadian farmer, improved his stocking rate fourfold. As he pithily observed, he’d gained the equivalent of another three farms at no extra cost, and is now harvesting and selling sunlight (in the form of beef) much more efficiently than under a set-stocked regime.

Another notable feature of mob grazing is that the permanent pastures don’t appear to become worn out. Conventional reseeding is unheard of, and both grasslands and their underlying soils are healthier than ever before. As practitioners regularly point out, it is farming in nature’s image, mimicking what has happened naturally for millions of years.

The Mob-Grazed Grass Plant

Grasses have been on earth for a very long time. Archeologists believe the earliest grass pollens date back some 65 million years. It is one of the most successful plant species on the globe, with grass plains covering much of the temperate regions of our planet. It provides a food source to millions of animals, both wild and domesticated, as well as forming the bulk of the human diet.

In the last five or six million years, the grass plant has evolved in conjunction with the great grazing herds of the plains and is perfectly adapted to periodic defoliation and subsequent rest periods. A key adaptation is the location of the growing point on a grass plant, which is found in the crown of the plant, at or just above the soil surface. This protects it from potential damage by large grazing animals and allows it to regrow quickly once the herds move on.

Another feature of the grass plant is the ability to store carbohydrates in its roots. As a plant is defoliated, it uses these root energy reserves to create new leaves (which grow from the protected growing point). These leaves in turn capture energy from the sun through photosynthesis which both replenishes the root reserves and is used for respiration and reproduction by the plant.

Different species of grass differ in the timing of their growth through the year, but all follow a broadly similar growing pattern. Upon awakening from winter dormancy, they start to produce new vegetative leaves and tillers from their growing points. These leaves are like mini solar panels, all helping to intercept the sunlight that streams down to earth, converting it into chemically stored energy. Growth during this phase is rapid.

After a while, the plant has sufficient energy-capturing leaves to allow it to enter into its reproductive phase. At this point, it starts to grow reproductive tillers, bearing the familiar stem and seed heads. Vegetative growth slows down as the plant puts much of its energy into the reproductive phase. At the end of this phase, annual plants senesce and die, whereas perennial grass plants enter a brief stage of slow growth before a secondary vegetative growth stage begins at the back-end of the year.

Traditionally, livestock farmers graze plants during the vegetative stage, stopping the grass from throwing up reproductive stems and restarting the cycle.

However, many of the mob graziers I met believe grass plants become exhausted over time if they are not allowed occasionally to complete their natural life cycle – necessitating reseeding and other costly remedial work. They emphasized that a plant was only fully mature at no extra cost, and is now harvesting and selling sunlight (in the form of beef) much more efficiently than under a set-stocked regime.

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Traditionally, livestock farmers graze plants during the vegetative stage, stopping the grass from throwing up reproductive stems and restarting the cycle.
They are not averse to grazing a plant before it reaches maturity but they believe firmly that occasionally the grass plant has to be allowed to follow through all the phases of its lifecycle to remain healthy. As they regularly pointed out, grasses have evolved under a system of rapid and extreme defoliation followed by many months of uninterrupted growth and grow best under such systems.

An interesting result of allowing the plant to reach maturity is the vast quantities of forage that are produced per hectare. Some of the warm-season, or C4 grasses I saw in North America stood higher than the cows, at over six feet tall and even here in the UK, stems of between four and five feet are achievable.

Equally interesting is the claim that underground roots mirror the above ground forage. The picture (pg 8) shows an experiment in the US where bunchgrasses were defoliated at different heights, demonstrating quite clearly this phenomenon. Allowing plants to mature fully results in the formation of large, complex and deep root systems. These are able to extract vital minerals from lower down in the soil strata, they are better able to reach water supplies during a drought and, when they die off, they leave huge amounts of valuable organic matter in the earth.

The huge amounts of above ground forage also capture large quantities of sunlight. As farmers, it is important to remember that this is what we are in the business of doing. We are selling sunlight (in the form of meat, milk, grains, etc.) to the rest of the world. The more efficiently we can capture the sun’s energy, (which freely streams down to earth every day) the more people we will feed and the more money we will make!

The seed heads on a grass plant are also full of carbohydrate and hence concentrated bundles of energy – admittedly not as plump as cultivated wheat or barley grains, but nevertheless they are extremely nutritious. Mob grazed cows, turned in to a mature pasture, strip the seed heads off the plant with relish. It’s like self-feeding grain to the cattle out in the field!
Finally, allowing grass plants to reach maturity and set seed means the pasture effectively renews itself each year. A significant number of the grass seeds will be shed onto the ground. Some will fail to germinate and will decompose (feeding the soil biota), some will be eaten before they reach the soil, but a significant number each year will land on the soil or on a cowpat and will germinate, constantly refreshing and reseeding the pasture, for free!

Soil

The huge amounts of both above- and below-ground organic matter produced when a grass plant is allowed to reach full maturity is a valuable source of energy and nutrients for soil organisms. A healthy, living soil contains billions of bacteria, fungi, nematodes, arthropods and protozoa.

Humus is a catch-all term often used to describe much of the soil organic matter. In its truest sense, it is an incredibly stable carbon compound which has amazing properties. It has many negatively charged sites within its molecular structure and these negative charges ‘hold on’ to the positively charged plant nutrients (eg nitrogen, phosphorus, potassium and other important trace elements). It has huge water holding capacity, acting like a sponge and thus both allows heavy rainfall to penetrate the earth (rather than flowing away into streams and rivers) and then holds on to the moisture, making it available to be used by the plants during periods of low rainfall and drought.

Another, recently discovered, substance is glomalin. It is critically important to the formation of good soil structure, being a type of ‘glue-like’ substance which holds soil particles together in peds and clods. It is believed to be exuded by the mycorrhizal fungi which live in a symbiotic relationship with healthy roots. Glomalin also makes us realize how little we know about the earth beneath our feet: despite the key role it plays, glomalin was only discovered by soil scientists in the mid-1990s. How many more key ‘players’ in the make-up of our soils are still waiting to be found?

The ratio of bacteria to fungi varied according to the land use. For example, heavily cultivated arable soils growing large amounts of annual monocultures will be predominantly bacteria-dominated. Conversely, undisturbed woodland soils with high levels of lignified material falling onto the soil surface will be populated by huge amounts of fungi and very few bacteria.

Permanent grassland sits somewhere in the middle, tending to have a balance of both bacteria and fungi in its soils. In a bacteria-dominated soil, annual weeds thrive. In a fungal soil, perennial woody shrubs do best. This allows us, as land managers, to study the weed species growing in our swards and fields to determine what is out of balance. In theory, if we get closer to the desirable ratios for grasslands, then desirable grass species will thrive and less desirable ‘weed’ species will not!

The Benefits of Organic Matter

Using mob grazing to build organic matter in your soils can have a dramatic effect both on the appearance and the productivity of your land. I have already referred to the capacity soil organic matter has for holding onto nutrients, making them more available for the growing plants. I have also mentioned the way organic matter improves the structure of the soil, ‘glueing’ particles together which not only improves water infiltration but also reduces soil erosion. In addition, this well-structured, high organic matter-containing soil has a much greater water holding capacity than soils with poor levels of organic matter – 1g of carbon can hold between 4g and 5g of water. This slows down the speed that rains pass through and over the soils, improving the water cycle and making more water available to the plant for longer during times of drought.

On Gabe Brown’s farm in North Dakota, where he has been mob grazing and growing cocktail cover crops for over fifteen years, I was handed a steel rod, some 1.2m long and with a small handle on top. Gabe asked me to try to push it into the ground. To my amazement, the rod slid into the ground like a knife into butter, all the way to the handle. Gabe explained that this was because his soils had excellent structure to great depths as a result of his focus on soil improvement and adoption of all available

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On Menoken Farms, also in North Dakota, Jay Fuhrer showed me the effect of combining mob grazing and cocktail cover crop mixtures to build organic matter, and the changes were equally dramatic. Grey sands were converted into a dark, rich, friable soil within just a few years.

Perhaps the most visually dramatic changes I saw, partly due to the scale of the change and the fact that it was a work in progress, was on Phil and Jill Jerde’s ranch in South Dakota. The Jerde family farm a huge herd of buffalo, using holistically planned mob grazing to utilize the grass efficiently and improve the ranch soils. The results, in an otherwise dry and sparse high prairie, were nothing short of amazing. Vegetation was starting to appear in the natural draws, or valleys, in the landscape and more productive forage plants were starting to colonize this newly fertile soil.

The water cycle was starting to function again. The infrequent rainfall was no longer running off the land and being lost, but instead was being absorbed and slowly seeping through the soil profile.

There were hundreds of draws and valleys on the Jerde ranch that were showing signs of being transformed. Those on lower land were much further advanced, with the green, lush forage starting to spread high up the sides of the draws. Draws much higher up were only just starting to show signs of improvement, with small, isolated patches of more productive grasses and other plants growing in the base of the draw.

The beauty of this is that as more grasses are produced, there is more organic matter available to be trampled into the soil. This further improves soil fertility and water holding capacity and so the rate of improvement increases still further.

The improvements were most clearly visible when standing alongside the boundary fence on the Jerde’s ranch, comparing their grassland with that of their neighbours. The improvements were tangible and were all a result of improving the soil organic matter content.
The Natural Farmer  Winter, 2014-15

Three Leaf Grazing
from Chapman's www.mobgrazing.blogspot.com

Populace convention in the UK and elsewhere says that grass should be grazed at the three-leaf stage. Beyond this, it either puts up a seedhead or, as it puts out a fourth leaf, the first one dies, so three is the magic number. Popular convention may be wrong!

Neil Dennis is a Saskatchewan farmer who runs cattle in mobs of 1,000 head. He packs them in tight and moves them every couple of hours. He's been mob grazing for a decade now and he says his land has changed out of all recognition.

One of the first noticeable changes has been to the growing pattern of his grass. As the mob grazing has improved the soil, the plants have been able to put down deeper roots. This has meant they are less drought prone in the 12-15" annual rainfall area that is south-eastern Saskatchewan. They also have a much longer recovery time between grazings so can develop fully.

Neil says the result is that they are no longer stressed, and a plant that isn't being stressed doesn't have to enter the reproductive phase, it can just carry on putting out new leaves. Not just any old leaves either. The claims Neil makes, that the leaves have gotten broader, longer and ‘juicier’ (a technical term for higher in moisture content measured using a refractiometer!) really appears to hold water.

Neil & I studied a grass plant, picked at random, from a field that had had 60 days’ rest.

The first leaf had indeed died off, a shrivelled up brown thing near the base of the stem. However, the plant had subsequently gone on to grow 13 more leaves, ALL of which were still green and busy capturing sunlight!

13 leaves! For those who are poor at math, that’s ten more than under the conventional rotational grazing practiced in the UK. So each plant has four times as much leaf area as conventional grazed ground would have. And an acre of ground being mob grazed by Neil would have 4 times the amount of feed. Juicy feed. Excellent feed. Three leaves either. The claims Neil makes, that the leaves are longer, greener and juicier than conventional grazed leaves, are certainly backed up.

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Making Milk from Grass at Stony Pond Farm

by Jack Kittredge

When it comes to agriculture, every state seems to have its rivalries. In Illinois and Iowa, bragging rights over which grows the most corn are serious business at harvest time each year. In Vermont, it is milk. Addison County, west of the Green Mountains and centered around Middlebury, claims the most dairy acreage. But Franklin County, at the extreme northwest of the state bounded by Lake Champlain and Canada, wins the contest for number of dairy farms.

One of those, proud proprietor of Stony Pond Farm in Fairfield, is Tyler Webb. Not a farm kid himself, Webb, now 39, grew up in Rochester, NY. “Anthropology was what I was interested in when I went to school,” he says. “Then I realized that the rise and subsequent fall of every organized civilization in history was due to soil erosion and over-grazing. That inspired me to be interested in sustainable agriculture and ecological design. I wasn’t a great student, but passed enough classes in anthropology to get an undergraduate degree in that with a minor in plant and soil science.”

Once he had his undergraduate anthropology degree, Tyler looked around for something a little more in line with his growing interest in agriculture. He met Bill Murphy at the University of Vermont and Bill convinced him to do a masters in sustainable agriculture and ecological design. He trained by shadowing Sarah Flack and Sarah Cushing around NOFA-VT as an organic inspector. He realized that they were building a lot of manure pits. “I had a real sense of envy for the camaraderie and meetings with organic farmers,” he recalls. “Somewhere along there I decided I wanted to participate in that.”

But Webb was fortunate enough to go to a lot of conferences and found himself in a lot of grazing meetings with organic farmers. “I had a real sense of envy for the camaraderie and understanding between these organic farmers,” he recalls. “Somewhere along there I decided I wanted to participate in that.”

Before working for NRCS he worked for a time for NOFA-VT as an organic inspector. He trained by shadowing Sarah Flack and Sarah Cushing around the state to learn how to do it. On one of those trips, in 2002, he saw a rundown small farm in Fairfield and decided he wanted to buy something like that. Two years later, in 2004, he bought it – what he calls “a barn, a run down house, and 35 acres of ‘pidge’.”

Tyler built the place up slowly, adding cattle and trying different ventures. He was hooked! Tyler and Melanie were married and had two children, 3 ½ year old Wyatt and威尔, now have two children, 3 ½ year old Wyatt and Wil-

Burlington Farmers’ market. To convince buyers that grass-fed beef could be tasty, he started grilling it at the market and selling cheeseburgers at $5 apiece. He bought focaccia bread from a local baker for the bun and cheddar from a nearby cheese maker for the topping.

It was a good thing his beef was tasty, because in 2007 a photographer from Brooklyn was visiting a friend in Vermont and went to the market. Her friend told her to check out Webb’s burgers and she was hooked! Tyler and Melanie were married and now have two children, 3 ½ year old Wyatt and Wil-

Melanie now works from home for a non-profit foundation that does advocacy work for people with disabilities and also works publicizing biodynamic Camp Hill communities. She also donates a lot of time to organizations working with people with development problems. Her mom moved from Connecticut to a nearby house. The cost of living here is considerably less than in the Nutmeg State, and her grandparents are here. This way she can watch the kids during Melanie’s afternoon milkings.

The farm was affordable to Tyler because it needed considerable less than in the Nutmeg State, and her grandparents are here. This way she can watch the kids during Melanie’s afternoon milkings.

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Tyler has a satellite photo in his barn which shows his land and grazing plans. All the land shown is either his or is land he rents. He has put in many of the roadways shown, plus the fencing—black is high tensile and blue is temporary polywire.

grew was all woody and mossy, full of blackberry brambles.

To repair the land and make it decent for grazing it needed a higher pH, better drainage, access roads that didn’t turn into mud in the rain, active grazing and manure.

“There is quite a lot of land,” Webb admits, “that is and manure.

Tyler has a satellite photo in his barn which shows his land and grazing plans. All the land

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“Those electric green strips,” he continues, “are the spoil where some of the ditches were dug here to make this area into paddocks. This is where I applied that as it was all one big place, but now there are lanes that go through, paddocks fenced with the lines fenced. With more and more cattle impacting it, it is coming back. It can raise grass and I’m going to have my cows eat what they can walk to!”

Tyler’s cows have access to the barn for bad weather along gravel roads. He has hauled in 300 tandem loads of gravel over a decade to build them. Each paddock is ditched to catch surface drainage, and the ditches are fenc ed out so the cows can’t get in them.

“I like the land,“ he muses. “I like the artistry of moving groups of cattle and watching the land repond. I like ditching, moving rocks, spreading ash. That is what I do the most. I admit I have a gravel problem! I wanted to do more section this fall, but I think I might have run out of money!”

Realizing that his initial farm was not big enough to support a grazing operation, Webb bought an adjacent farm and rents additional adjoining land. Despite being so far north, land in Franklin is expensive. Even in Vermont was marginal. He paid $750,000 for the additional 200 acres with a barn and a little modular house. To manage the cost he put that and his original farm into a land trust. So now it is all preserved for agriculture and his debt is much smaller because of the preservation payment he received. Webb has a satellite photo in his milling barn which shows the various plots, paddocks, lanes and buildings.

“We are right here,” he says, pointing to a spot on the lower right. “These white rectangles are the roofs of the new barns. This surrounding the barns to the edge of the map is the core farm, my first 30 acres. This piece in the lower corner is another 25 acres that I rent. I’ve been renting that since I moved here. Then this stuff in the lower middle of the map is the marginal 200 acres that we purchased 3 years ago and I have done a lot of work with. It has a Ph of about 5!

“Above that,” he continues, “in the upper middle, is the farm I rent. The heavy black lines are all two-strand high tensile electric fence, the inner, thinner blue lines are annually fenced paddock divisions. We tend to do our spring calving in this high and dry, south facing area to the middle right of the map.

But I move the cows out of there in the fall because I want it nice for the spring again.”

All that work was expensive, and Tyler is still paying off the debts from it. But he can get a tractor wherever he wants and has water in every single paddock. They are all securely fenced with high tensile perimeters and lot of poly defining the paddocks.

Because of his extensive experience putting in fences, Webb is often hired to install fences on local farms. Income from his fencing company is still a crucial component in meeting the family budget and will be, he figures, the primary income reduced. Besides providing income, the fencing work is also a matter of pride for Tyler.

“He is an example of my corner post system,” he points out. “The posts are pressure treated, which was iffy for organic for awhile, but is now approved for pots. You can’t use it for structures because the animals might chew on it. This is my p殴der for the fence posts. It is a 12 foot steel I beam with a 450 pound weight on the bottom. We drive them flat—they’re not even sharp on the bottom when they go in. It usually pushes any rock out of the way. I don’t use an auger. Post hole driven posts will ultimately heave or bend over because the auger has loosened the earth around them. Unless the tamped earth never falls out after using one, the post will eventually wobble, move and heave out.

“I have put in 65,000 feet of fencing this year,” he continues. “Most of that is high tensile—you can see the corners here. On the farm here I’m a master of the pigtail post and polywire! I have tons of it everywhere. In this section portable wire makes 7 or 8 paddocks on each side. All the reeds meet in the middle! I just have to set it up once and then take it down in the winter.”

During the day Tyler puts the milkers in paddocks with some shade. For his day rotation he can extend out to 50 or 60 days, but at night he uses a limited number of paddocks closer to the barn and would like to keep a 30 to 55 day loop.

One of the problems with grazing in Franklin County, however, is that most of the grasses are cool season ones and slow down in the summer when it is hot and dry. The soil biology is hungry and the fungi are experiencing a lignin deficit. But two of his improvements are designed precisely to deal with the need to supply water and nutrients to his fields in those cases.

The conventional answer to the problem of getting nutrients to the fields on dairy farms is the liquid fertilizer pit and spreading the slurry when it can be incorporated. But Webb didn’t like that approach from his NRCS days. Instead he had a solid manure/compost facility on a pad to collect leachate and channel it into a 20,000 gallon tank. The water could be used to irrigate the fields and supply both water and nutrients when they were needed. But instead Webb installed 6-inch piping to bring the nutrient-rich water from the pond to the fields. Tyler didn’t like either the high costs of hiring heavy equipment, the timing, or the damage they did to his fields by compacting them.

“We looked at the costs of emptying a pit when the guys with the equipment are available to do it, which is right now in the fall when it is wet and there is a potential for real compaction. But these guys wanted to come in with 7,000, 8000, 10,000 or even 20,000 gallon tankers and drive around on our fields spraying out nutrient-rich water. The estimate to empty the pit was $5,000 to $7,000.”

Instead, Webb installed 6-inch piping to bring the nutrient-rich water from the pond to 5 hydrants in the fields. He bought a 115 horsepower John Deere irrigation pump that can handle 250 gallons a minutes wth a “traveler” with 1000 feet of poly hose. The traveler can roll up and down the field, to the extent allowed by the poly hose, spraying water from the pond.

“I can hook up to the hydrants,” he explains, “and then there is a little gun you can pull out up to a thousand feet and that pumps 250 gallons a minute. You are going to get one period here of several dry weeks when you are either going to over graze or be extending your rest period to 45 or 50 days. If I...
had this system hooked up in September I definitely could be still grazing right now, three weeks later than when I ended up. That is a lot of money when you are buying round bales to replace the grazing.

“So in this area now I can graze a paddock at night,” he continues, “and the next day I could hit it with a half inch of leachate water from my pond with this irrigation set-up. That way I could get rapid regrowth.”

Tyler uses a slinger spreader to apply his dry manure. It has a large component of straw bedding, which is a wonderful source of lignin to feed soil microbes. The slinger spreader breaks the dry manure into particles so small that he can put on a half ton, or even a ton, in July and hit it with a half inch of water the same day.

People looking at Stony Pond Farm’s cattle might come away scratching their heads. The mix of breeds is a little strange for most New England farms. There are Jerseys, Devons, and British White mixed together. The calves are even stranger, with mixed breeds quite common.

The British White is a relatively unknown beef breed. It’s an old breed like the Devon, and like the Devon they have not been promoted in modern agriculture. That means their genetics haven’t been compromised by the grain industry and individual animals still do well on grass. Webb says that in the summertime the Whites don’t get hot and bunch together like a group of Angus will, but spread out over the pasture.

The farm’s milk cows are Jerseys, a reliable dairy breed with good butter fat. But Jerseys are a surprisingly tasty beef breed as well. As a result the farm breeds Jersey heifers with British White (Jersey/British White crosses come out pretty white — the white is dominant) and the resulting male calves are raised for beef.

“We’ve done a lot of taste tests,” says Webb, “and Jersey meat is the best tasting beef, hands down! The carcass yield is not that viable, of course, but if you can milk a cow for several years and then her burger is also good, that is real value added. We take these Jersey beef steers all the way to 2 years before slaughter. They’re born one spring and go two years to that summer.”

The farm’s Devons are milking Devons, not beef Devons. The milking ones are a tri-purpose breed for milk, meat and draft. They helped settle Vermont, but like many general breeds they are not really good at anything – they don’t make much milk, no one pulls with them anymore, and they make good beef off mediocre forage but they take a while to mature. In addition, Tyler doesn’t like the fact that they have horns. The British White, in contrast, are naturally polled.

“Long term Webb would like to get out of most of the pure beef cows and just raise cross-bred steers, breeding his heifers with a Devon or British White bull. Although they might not be as big as true beef cattle, he finds that a separate breeding herd for beef is a little challenging.

“The problem is,” he explains, “you can breed a Jersey at 15 months old, but you can’t breed a beef cow at 15 months. They are slower developers. So we...
“If your plant is 10 inches tall,” he points out, “the roots are 10 inches deep. If you graze that down to two inches, the plant kills off its own roots down to two inches. Then it will regrow enough forage to harvest enough sun to regrow those roots. But there is not enough time for that to happen now before those killing frosts. If plants are in that regrowth phase but don’t have the roots and then you have a hard frost, you can set that plant back. I’d rather pull the cattle off the pasture and feed them hay, then go out again in mid-November after a few hard frosts, especially morning when the ground is a little firmer, and let them graze a little, eating high, so long as they aren’t eating down to those tillers for next year. Winter grazing is the same, in theory: You are just stockpiling that forage and you go back out in December and get it.”

In the summer, of course, the plants can be grazed because they have had adequate rest—they have the energy, the water, and are in their active growth pattern as they are trying to put out seeds. But in the fall, in response to light, the plant is slowing down and sending out tillers in preparation for next year when the favorable conditions will be back again. This is true for all cool season grasses, which is what predominates in northern Vermont.

“If you go out to the paddocks right now,” Webb advises, “you’ll turn one paddock into 2 paddocks then,” he says, “blaze right through them, and be back again preparing their thriving business for growth. Again, you want to eat it now. Orchard grass is amazing, I’ve seen that look at it from afar it looks like there is a lot out there. But the cows don’t want to eat it now. Orchard grass is amazing the first of May, but right now it sucks. They’ll eat that Kentucky blue and white clover right down to the ground, but leave the orchard grass.”

“You have to have an extra complication for rotations, putting with another bull, etc.”

Bill Murphy was Tyler’s advisor in college. He was at University of Vermont and wrote the iconic 1998 book “Greener Pastures on Your Side of the Fence.” As a local guru who taught the Voisin intensive system he was really responsible for bringing grazing back to Vermont agriculture.

Part of Murphy’s teaching is that you as a farmer need to study your grasses and how your animals do on them. Cattle and grass co-evolved and they are good for each other. But you must watch the preferences your cattle have and make sure that what they are eating builds ultimate pasture health.

“Before we started our business, we hired someone to do our payroll who wasn’t familiar with agriculture and made a number of mistakes,” said Ryan. “When we started our business, we hired someone to do our payroll who wasn’t familiar with agriculture and made a number of mistakes,” said Ryan. “That person just didn’t understand the regulations specific to agriculture, so we turned to Farm Credit East.”

In addition to financing assistance for several expansions, the Voilands discovered that Farm Credit East could also be a key resource in preparing their payroll. “When we started our business, we hired someone to do our payroll who wasn’t familiar with agriculture and made a number of mistakes,” said Ryan. “If you go out to the paddocks right now,” Webb advises, “about grazing at this time of year (October). I’ll go out and graze a bunch at the end of November or early December, when the ground is firm or almost frozen. But this land is too wet. There would be too much damage to next year’s tillers. Those tillers are being sent out now – that is the primary growth for next year. Most cool season grasses aren’t going to regrow from whatever is left if they are destroyed. If you look at orchard grass it won’t grow next year from this year’s leaves. It will regrow from those little tillers it is sending out now. Even stepping on those, or eating those, right now will set you back a lot. I would rather be out the last week of April than the middle of October.”

“I’m pretty sensitive,” Webb advises, “about grazing at this time of year (October). I’ll go out and graze a bunch at the end of November or early December, when the ground is firm or almost frozen. But this land is too wet. There would be too much damage to next year’s tillers. Those tillers are being sent out now – that is the primary growth for next year. Most cool season grasses aren’t going to regrow from whatever is left if they are destroyed. If you look at orchard grass it won’t grow next year from this year’s leaves. It will regrow from those little tillers it is sending out now. Even stepping on those, or eating those, right now will set you back a lot. I would rather be out the last week of April than the middle of October.”

Farm Credit East Congratulates Thriving CSA From the Ground Up

Ryan Voiland, owner of Red Fire Farm, got started farming while still in high school. Shortly after college graduation, he purchased his first farm and his business has been growing, from the ground up, ever since.

To accomplish their expansion goals and provide adequate shares to a growing client base, the Voilands turned to Farm Credit East to help purchase land of their own and expand the business. “I talked with other banks, but Farm Credit East has a much deeper understanding of agriculture,” said Ryan.

In addition to financing assistance for several expansions, the Voilands discovered that Farm Credit East could also be a key resource in preparing their payroll. “When we first started our business, we hired someone to do our payroll who wasn’t familiar with agriculture and made a number of mistakes,” said Ryan. “That person just didn’t understand the regulations specific to agriculture, so we turned to Farm Credit East.”

With key financing opportunities and the added protection of payroll support, Red Fire Farm has grown to be one of the largest CSAs in Western Massachusetts. Serving more than 1,500 CSA summer shares, plus 2,000 fruit, egg, flower and winter shares, they’re once again preparing their thriving business for growth.
A loss of productive energy. The problem of funny protein versus funny protein,” Webb recalls. “Funny protein is non-protein nitrogen in your forage. These nitrogenous compounds are not true protein. They are non-protein nitrogen that has not been assimilated by the rumen microorganisms and that protein isn’t necessarily protein. When you are applying liquid manure and a ton of potassium the plant is a luxury consumer. It will grow to be 8 to 10 inches tall again really fast – in 30 days. But farmers have stopped paying attention to boron and trace minerals. If you put lime on you have enough calcium in your forage, but magnesium is the dump truck that brings calcium up and boron is the key that opens the door for the plant to actually use it. With the presence of all those minerals the nutritional quality of the grass in complete and can be utilized by the cows. But it seems like, in some of our more modern and industrialized fast-paced ag approaches, we’re growing forages that aren’t as complete. We’re allowing the balancer or nutritionist to make up the difference in the Total Mixed Ration by making sure the mineral pack is there and the grain is adequate to balance that.”

The main business of Stony Pond Farm is milk production, marketed through Organic Valley Cooperative. Tyler and Melanie have explored what it would take to do a value added enterprise in addition, such as ice cream, frozen yogurt, mozzarella, or ricotta cheese. But Tyler says he realized that he hates doing dishes and those ventures mean he would live in a world of cleaning stuff.

“I like milking cows,” he asserts, “the grounding aspect of it. There is so much to do that having to come back and be present for a couple of hours with the girls is a good grounding thing.”

Operating a dairy has some downsides, of course. One is that the calves have to be separated from their mothers or they would drink more milk than they are able during the first 100 days of their lactation. After the first 100 days your losing a little money. The first hundred days you have to make enough to cover her expenses for the rest of the year, so on our farm during those first 100 days the cows are on the best grass of the year.”

It used to be completely legal for Tyler and Melanie, as a licensed dairy, to sell some quarts of raw milk every day. But then Vermont introduced a tiered system to make it easier for small dairies to sell raw milk. As a part of that system they added some extra testing and other provisions. At the same time Organic Valley said they didn’t want their farms to be engaged in a raw milk business. So the couple decided it was too much of a liability for them to continue selling raw milk.

Prices for conventional milk are strong right now and have been for a while. You see a lot of new barns and new equipment on dairy farms right now. Webb says he has always been of the attitude that the best way to keep the small farmer happy is to keep the big farmer working. You see a lot of custom operators to do work for him, not having the equipment, and would like to make sure they stay in business.

For Tyler and Melanie, it has been tough managing the debt and all the investments needed to build the business. This year has been a little better than last. But it just costs a lot of money to get into farming.

“We don’t drive nice cars or have nice tractors,” Tyler states. “We’re not heavy into equipment. But 300 loads of gravel, 20,000 or 30,000 feet of fence, thousands of feet of water pipe, water spring development, a well – that’s not cheap. We'll gross close to 300 loads of gravel, 20,000 or 30,000 feet of fence, thousands of feet of water pipe, water spring development, a well – that’s not cheap. We’ll gross close to 300 loads of gravel, 20,000 or 30,000 feet of fence, thousands of feet of water pipe, water spring development, a well – that’s not cheap. We’ll gross close to 300 loads of gravel, 20,000 or 30,000 feet of fence, thousands of feet of water pipe, water spring development, a well – that’s not cheap.
to $300,000 and spend $270,000 to do it. It’s amazing to me! Last year we lived on $29,000 for a family of four. But it’s not a bad way to live -- we work like dogs and eat like kings!

“The combined businesses on the farm,” he continues, “the dairy and the fencing company, are generating a 27% profit, which is pretty impressive, but we don’t see a penny of it because the debt load is so high. The dairy generates a 12% profit by itself. The fencing business is profitable. And besides that we do the Burlington farmers market on Saturdays with freezer beef and we grill cheesburgers down there and that adds a lot of value. But we serviced $85,000 of debt last year. I still have to work an outside job to make ends meet.”

Webb feels fortunate to have a customer base that is willing to pay more, and expects more, both in the quality of the food and of the environment where that food is produced. The real question about profitability, he feels, is what is a reasonable amount to ask of our cows.

“Our farm is based on the fact,” he explains, “that we want 10,000 pounds of milk from a Jersey, which is pretty good production but far from phenomenal. The national average of the top Jersey producers is 18,000 or 19,000 pounds. There are Holstein high-production herds pushing 30,000 pounds a cow. That is amazing to me. That is a lot to ask of a cow, much less in a grazing situation.

“It costs a lot to get your forage up there,” he continues “but what we are trying to do is make a little region of cool season grasses and energy is a little bit less in a grazing situation. As for the future, Webb jokes with people that your beef is the best!”

He feeds about 8 pounds of grain daily, on average, to his steers high-production herds pushing 30,000 pounds in 365 days. His cows weren’t breeding back as fast as ours are, so he’s milking them longer. They might be energy deficient, I don’t know. His average lactation period is 80 days longer.

“Beef is a tough business,” Tyler sighs. “There is a lot of competition. You can’t just sell your meat to anyone. We sell at the Burlington farmers market. Our culls are just those that are bred out of our window,” he says, “and tend to be in pretty good condition. We do 12 to 15 animals a year like that. If you milk a cow she might gross us $3000 in a year in milk sales and if I sell her to McDonalds for $350 or if I grill her myself at farmers markets it is another $3000. It adds a lot of value to our enterprise.”

He does veal, too, as a market for his male calves -- a pasture-raised organic veal. They are on pasture but they get 2 gallons of whole milk a day. In three and a half to four months they’re ready. Those, too, are sold at the Burlington farmers market.

“Beef is a tough business,” Tyler sighs. “There is not a lot of money in it. The margin isn’t great. So we’ve decided to scale back. But everyone says our grass-fed burger is the best!”

As for the future, Webb jokes with people that your twenties is when you carry 5-gallon buckets every day and I’m a ski bum so I need to earn my rent. Every year I have a fall project, this year was taking rocks out of a pasture. It may be that as we cut back our beef operation we’ll raise a few more milking cows. But it is all working and I’m ready to have it stabilize.
Starting with Lambs: A New Farmer’s Story

Our lambs with our chicken tractors (meat chickens) and egg mobiles (laying hens) following behind them

by Chris Browder

Winter, 2014-15

My wife, Holly, and I are new farmers. After long careers in the financial and consulting world, we left the concrete jungle of Manhattan for the agriculturally oriented North Fork of Long Island. After one season working as an apprentice at a local organic vegetable farm, we launched Browder’s Birds Pastured Poultry Farm in early 2010. This year marks our fifth season raising certified organic, pastured egg and meat chickens. We were enamored with the rotational grazing model Joel Salatin made famous and was so eloquently discussed in Michael Pollan’s The Omnivore’s Dilemma. Salatin’s own books, Pastured Poultry Profit and You Can Farm provided further detail into the system. We were determined to mimic his system as best we could give our situation. We started with absolutely nothing in terms of infrastructure and leased a 5 acre parcel as part of a New Farmer Initiative created by the Peconic Land Trust. The only problem with our poultry rotational grazing model was we didn’t have any animals. So we turned to Polyface Farm and the Peconic Land Trust for help. Our first year we purchased five. One that they raise for educational programs with sheep looked like the perfect solution for us. Now highly sought after here on the East End of Long Island, they are a truly unique animal. From a market standpoint, sheep create potentially higher prices and so disease management appeared to be something we needed to work on. Lamb diseases are not easily passed to one another, and so many venture slightly, but not far from the herd. A dog might. They want to stay with their buddies (though they will likely run away like this later), they likely weren’t going to run away like this is a way to save us from spending so much money on gas. But what kind of animal? Our first requirement was that we wanted an herbivore, a true blue mammal. We bought it, we wanted it, and we certainly enjoyed seeing them daily. Sheeps love mags, so he grazes the chickens on the mowed down pasture and they feast on the forage and mags.

In our case, we were having to mow our pasture routinely because in the spring, early summer and fall, our pasture of perennial rye, fescue, timothy grass, orchard grass, clover and alfalfa was growing so rapidly it became too tall and thick for our egg layers and meat chickens to navigate. We felt we needed an animal that could act as our lawnmower to free us up so we were mowing 100% more area and so much money on gas. But what kind of animal? Our first requirement was that we wanted an herbivore, a true blue mammal. We bought it, we wanted it, and we certainly enjoyed seeing them daily. Sheeps love mags, so he grazes the chickens on the mowed down pasture and they feast on the forage and mags.

What about sheep? We knew other small farmers who used sheep as their lead herbivore with their chickens with good results. They were animals that could thrive entirely on pasture forage with the addition of a few scattered salt licks, mineral mixes and water. The sheep are only needed as a three sided rudimentary shelter which I already had in the form of our chicken tractors. They could handle the cold weather and storms we would see on Long Island. Due to the herd of sheeps, they often possess a docile nature and generally are easily handled. Perhaps best of all, they are hard animals. If they were not in one thing we’ve learned in farming it is that under no circumstances should you ever take on more than you can handle. Start small and build a bit each year. Since we had zero experience with sheep, 20 seemed entirely too many. So, we started with five lambs, all wethers (castrated males).

We didn’t know much about Cotswold sheep, but we’ve learned a lot over these past three years. Cotswold descended from a long-wool sheep introduced by the Romans in the first century A.D. They flourished in the hills of the Cotswolds in England near the Welsh border and by the 15th century were responsible for generating great wealth in England. Many of the great cathedrals and churches in England including Gloucester Cathedral were built from the wealth created by Cotswold products. They were introduced into the US in 1832 and by 1879 were the most popular breed in America. By 1914, over 760,000 were recorded here. Unfortunately, once the Merinos were introduced in the US from Australia, Cotswold began declining in popularity and nearly became extinct. In 1993, fewer than 400 lambs were registered in the US and England. Thanks to many conservation groups, Cotswold have been removed from the rare breed list and are enjoying a resurgence due to their lustrous fleece and mild flavored meat. For spinners, the fleece has a micron count in the 40s and one sheep can generate 15 lbs of wool per shearing with curly fibers up to 12” long. The fleece is often referred to as poor man’s mohair.

As advertised, Cotswolds have been a true joy to raise, even for a beginner. We received our first batch of lambs in May and each weighed approximately 30 lbs. We put them into our rotational grazing plan complete with portable electric netting, moveable shelter, water, salt and mineral mix. They demonstrated voracious appetites and mowed down our pasture to the perfect level for our hens and meat chickens. We moved them to fresh pasture once every 1-2 weeks and they quickly learned to respect the electric currents flowing through the fencing. We found that the lambs didn’t require significant management time other than rotationally grazing them and we certainly enjoyed seeing them daily. Cotswold are docile sheep, generally friendly with humans, curious and easy to handle. So we were thrilled with having them on our farm and appreciated the job they did for us. We grazed them all summer and fall on our pasture and in early December, when they reached about 100 lbs each, we had them slaughtered for meat for our customers.

Our second year we followed the same game plan except this time we purchased 10 lambs in the spring instead of five. We received them in May, grazed them until December and sold them for meat for the holidays. This season (2014) marked our third raising lambs, and we again purchased 10. We decided that we were ready to make the leap and try our hand at breeding Cotswold. After searching the US, we found a prize winning 300 lb ram in Massachusetts and purchased him for around $400. We also purchased two excellent 2 year old ewes that had hails been bred from Suffolk County Farm. We put all three of them together on pasture and we hope to have baby lambs from them this winter/ spring. Of the lambs we purchased this season, several are fine looking ewes, so we will retain at least two of them for our flock. The remainder will be processed for meat before the holidays. We are entering this winter with excitement and some level of angst regarding the possibility of birthing our own lambs this winter. We will be as prepared as possible, but to say we are a tad nervous is a bit of an understatement.

As beginners, we wanted to successfully develop a market for as many parts of the lambs as possible. Each fall we have our lambs slaughtered and sell the raw wool at markets and online. We sent some of the raw wool to Battenkill Fibers in Greenwich, NY and they converted it into fine, beautiful yarn that we also sell. For those lambs that we had slaughtered, we saved the pelts and sent them to Bucks County, PA for tanning. The end product was breathtaking and we had no problem finding willing buyers for these beautiful pelts. In fact, it used to be in England that you were considered wealthy if you owned a Cotswold sheepskin. Finally, we sold the meat from our lambs to our existing poultry customers. Many of them have raved about the mild flavored meat and have thanked us for thoughtfully and carefully raising their meat.

We’ve had a few challenges along the way, so we would be remiss if we didn’t mention a few of them.

1. Plan for ample food - These animals eat a tremendous amount of forage in a short period of time. Last year we had a dry summer and no pasture irrigation. As the fall approached, it was obvious that we were going to run out of good forage on our pasture. We realized that we needed to get...
quick access to a lot of hay or find a new pasture on which they could forage. Hay is expensive here on Long Island so I wanted to avoid digging into our profits if possible. One of our friends/neighbors was willing to take our lambs for a few months. She had plenty of pasture and better fencing than we did. We were fortunate to have someone willing to assist. We learned from this experience that we need to insure plenty of pasture to factor in the weather and have some hay on hand if it gets bad.

2. Portable electric netting is good, not great – It’s great for rotational grazing sheep. Nevertheless, we recommend that any pasture with sheep have a permanent perimeter fence. Some of our lambs have gotten wise to the fencing and learned that the bottom line of netting on the fencing isn’t electrified. There is always one who learns he can stick his nose under the bottom and squeeze his body under the fence. Unfortunately, this is information the other lambs learn by watching. There have been plenty of times I’ve gone out to our pasture and all of the lambs are grazing outside of the fence. There are two things we’ve learned to keep this activity to a minimum. First, keep a fresh battery on the electric netting. They seem to be less inclined to push under if they think they will get zapped. Second, rotationally graze them sooner than you would like. Often, the pasture they see on the other side of the fence is more enticing than what they have in front of them. If the scale tips toward taking the risk, the lambs will seek out the fresh pasture.

3. Disease management – Like all other animals, lambs can and do get sick. Sheep are extremely sensitive to copper and can die quickly from copper toxicity. One of our lambs did. To determine the cause, we tested the forage, the salt and the mineral mix and none showed copper issues. To this day, it remains a mystery how the copper was ingested. We also struggle with meningeal worm of white tailed deer on Long Island. This worm is potentially devastating to sheep as it impacts their nervous system and can make them lame or crazy. For the first time, we’ve begun deworming our lambs since we have tremendous deer pressure here. The risk is too great otherwise. While sheep and chicken diseases are not generally passed to each other, pathogen issues need to be considered. We are careful to graze our lambs ahead of the chickens and let the pasture rest before bringing the lambs back through.

4. The emotions associated with slaughtering lambs – This has been particularly difficult for us. These lambs are wonderful creatures and it’s very easy to become attached to them when you care for them daily. Taking them to the slaughter facility can be heartbreaking. I don’t know of any easy way to deal with this. For us, we take comfort in the fact that our customers greatly appreciate the meat we provide them and thank us for how we take good care of the lambs. One of the reasons we wanted to breed Cotswolds is so we would have sheep year round even after we take some in for slaughter. It was an empty feeling having lambs one day and none the next. We hope this will ease the sense of loss we feel.

As a new pastured poultry chicken farmer and a very new lamb/sheep farmer, we’re happy with our lead herbivore for our pastures and what a wonderful experience it’s been. We love the beautiful Cotswold sheep with their docile and friendly demeanor. If you are thinking of a few sheep for your farm, you should take the leap. If you are like us, you will find it incredibly rewarding.
What is good grazing management?

by Sarah Flack, Organic & Grass-Based Livestock Consultant

The Benefits Of Good Pasture Management

When done correctly, livestock grazing can create many benefits for the environment, plants, soils, animals and farm income. Pasture plant quality and soil health can improve, animal welfare can be bettered, feed costs can go down, animal performance can increase and farm finances can become more sustainable.

Good grazing management can change pasture plant species without tillage and reseeding, by just using animal impact from grazing. This can convert weedy brushy pastures, where animals have to search to find good quality forage, into highly productive pastures, which feed more animals higher quality forage.

These improved pastures provide low cost, high quality feed, which is particularly helpful for farmers facing rising feed and fuel costs. With high quality pasture in the ration, farms can decrease the amount of purchased grain, and forages. Other cost savings can come from having cows harvest their own feed instead of paying for fuel needed for mechanical harvest, storage and feeding.

As pastures improve plant density and diversity increases and pests are protected from erosion and compaction. Soil health is also improved by increased plant root growth and improved nutrient cycling.

In addition to these many benefits to plants, soils and livestock, there are changes in the meat and milk of pastured animals. Ruminants whose diet includes more forage and less grain produce meat and milk that contain different amounts and types of nutrients than grain-fed livestock. The nutrients that can be in higher amounts include beta-carotene, vitamins A, E and D, omega-3 fatty acids, conjugated linoleic acid and others. In addition to research supporting the higher nutritional value of these foods, consumers are also attracted to the same benefits of grass farming, including improved animal welfare and the many environmental benefits.

With all these benefits, it is no surprise that there is growing interest from both farmers and consumers in grass farming. However, for beginner farmers or farmers new to grass-based livestock farming, the number of suggestions on the "best way" to improve soil fertility, forage quality and pasture production can be overwhelming. This is particularly challenging to farmers who have not yet learned the basic core principals of good grazing management.

Without a solid understanding of the basic guidelines of how to set up and manage a pasture system, it is easy to get side tracked by the latest new idea and end up with a system that doesn’t meet the quality of life needs of the farmers, the financial needs of the farm, or the production & welfare needs of the livestock.

Types Of Grazing Systems

An effectively designed and managed grass based livestock operation requires an understanding of the basic principals of grazing management. It requires understanding what pasture plants need, what livestock need, and what each land and crop management system takes to get the right infrastructure. This knowledge makes it possible for the farmer to choose which type of grazing system best fits their own farm and family goals, and to customize it so that it really works.

The methods of pasture management include systems that are simple rotational grazing systems and large continuously grazed pasture systems. By intensive we are not talking about how short the pasture is grazed down, it refers to the management itself. The good management intensive systems provide livestock with new areas of high quality pasture frequently, but then give those areas of pasture time to regrow before the next grazing.

When compared to the more intensively managed systems, continuous grazing requires less daily management in moving the cattle, fence and water tubs. However, continuous systems are less efficient, so they require more acreage of pasture, more clipping and may require occasional pasture reseeding and renovation over time due to overgrazing damage. Continuous grazing systems, particularly systems where cattle continuously graze the same pasture for most of the grazing season, usually provide less high quality feed. These types of management may result in lower growth rates and milk yields, but require less day-to-day management.

By shifting from a continuous system to a simple rotational system, it is possible to make some improvements in pasture quality and quantity. Pasture productivity, however, will still be lower in a rotational system compared to an intensively managed system. A key difference between a simple rotational system and a higher quality system is that the better grazing systems pay close attention to how fast plants are growing. This requires that the recovery period after each grazing be increased as growth rates slow to make sure plants are always fully recovered before the next grazing. This key principal of variable recovery periods is essential to create the highest quality pastures.

Pasture plants need time to rest after each grazing in order to photosynthesize and replenish the energy stored in the base of the plant and in the roots. Continuously grazing animals in the same pasture, or returning them to a pasture before it is fully regrown, does not give plants time to recover and results in overgrazing damage. Continuous grazing also gives cattle or grazed animals down time short, which can damage the plants. The resulting weak plants may stop growing or die. These weakened plants overgrazed plants will not compete well with weed species, will not hold soil well, and result in bare soil and erosion. Some grasses and clovers will survive by staying very short, never growing tall enough for livestock to graze easily. At the same time in that pasture, livestock will reject areas that will soon grow up into tall patches of grass, weeds, brush, or small trees. In continuously grazed pastures, there may also be a buildup of dead plant material or thatch on the soil surface and cow pies that have not decomposed quickly. These are all symptoms of grazing damage.

Over the years, many terms have been used to describe the better-managed grazing systems. Andre Voisin used “Mob Grazing” in his writing in the 1950s. More recently grazing consultant Jim Gerish and others use the term Management Intensive Grazing (MIG). I like this one as the emphasis is on the importance of the Management! Work by Allan Savory created Holistic Planned Grazing. Holistic Grazing is part of a comprehensive Holistic Management planning system, which includes financial planning, biological monitoring and establishing goals. Prescribed grazing is a term used in many NRCS publications. The term ‘Mob Grazing’ is used commonly now, and refers to use of high stocking density with long recovery periods. However farmers using holistic planned grazing or MIG may also use high stock densities and long recovery periods.

But keep in mind that what is more important than the name, is to know what key principals all successful grazing systems share. Successful grazing management pays close attention to the needs of the plants, the livestock and soils. So whatever the name, these systems will favor the better pasture plant species, reduce weed problems, improve soil health, and increase the quantity of pasture dry matter produced while improving the nutritional quality of the feed.

Grazing guidelines:

• Allow plants enough time to fully regrow and recover after each grazing
• Graze livestock in each area for a relatively short time (short period of occupation) to prevent “re-grazing”

A good quality pasture should contain a mix of many plant species, no bare soil, and uniformly distributed manure from the most recent grazing. In a continuously grazed or simple rotation system, where plants are not allowed to recover fully between grazings, there are more likely to be patches of bare soil, less vigorous desirable plants, and increasing weeds. Patches will appear that never grow very tall, and eventually many of the desirable pasture plants will disappear.

Setting up the grazing system part one: The Plants

To provide the highest quality feed, farmers give animals a fresh pasture after each milking or twice each day. Some farms may move the herd more frequently than twice a day using strip grazing or other methods. This will allow for a higher stocking density and will more quickly improve pasture quality. Strip grazing is a strategy frequently used in mob grazing, and it is done by moving fence forward frequently, giving the cattle a new strip of fresh pasture each time.

If farm labor doesn’t allow for that much time moving cattle or fences, it is possible to use larger paddocks and move livestock less frequently. The important guideline to follow is that livestock return to the pasture only when it has fully recovered. Here in the northeast, this may be as soon as 18 days in early summer when plants are growing rapidly, but it may be 40 days or later in the summer. The length of the regrowth period will vary significantly depending on soil moisture, soil fertility, plant species, past management and temperature. Ideally, farmers move animals frequently and each paddock is not grazed for more than three consecutive days. Using smaller paddocks and moving the herd more often will provide more consistent high

A high producing dairy cow grazing in a diverse, high quality pasture uses her tongue to grab a mouth full of pasture. This photo was taken just as the herd was turned into one of the new paddocks they get after each milking.
It is important that as pasture growth slows the speed of the rotation must also slow down. This is usually done by adding more acreage to the rotation. If the number of grazing acres is not increased, plants will not get enough rest, and animal dry matter intake will drop resulting in poor animal and pasture performance. Timing the first cut of hay early enough to allow some areas to grow back tall enough for grazing later in the season is the easiest way to add in more good quality pasture when plant growth slows in the summer. Paddocks should not be grazed in the same order. They should instead only be grazed when they are ready! This is another key difference between a simple “rotational” system and better-managed systems where the emphasis is on plant recovery periods.

So what to do when the pasture quality isn’t as good as we want it to be? A common approach to “fixing” pastures which have become weedy or not productive enough is pasture renovation. Renovation of a pasture is a management practice that is used to remove dead plant tissues, which is a labor intensive and costly project to take on. This is why it is important that less expensive options for restoring or improving the field have not been overlooked. Keep in mind that if a pasture is plowed and reseeded but the grazing management system is not changed, the reseeding will only provide a temporary solution to poor pasture quality.

As we have already discussed, improving the grazing management is the first way to try to improve pasture. Additional improvement ideas include assessing soil health by both visual observation, measures of soil compaction and soil testing. This may indicate that adding fertility, improving aeration or drainage is necessary. If minor improvements in plant species are needed, frost seeding can be done. This is a low cost method of broadcasting seed on frozen ground. The frosting and drying action of the soil also helps the seed to be incorporated into the soil. Frost seeding works very well with legumes, but is not generally as effective for most grass species.

Once non-tillage options have already been tried, and the decision that reseeding is necessary is made, it is important to make sure time and money spent is carefully planned. This should start with a thorough evaluation of the soils including how wet or dry/drought they are, soil type and soil testing. This provides the information needed to choose the right mix of plant species. For example, some pasture plants thrive in wet soils, while others will not survive there. Other factors that are important to think about in choosing what to plant include the local climate, the type of grazing livestock, existing weed pressure, and the length of time the stand is needed. There are a lot of differences regionally, so when reseeding a pasture in northern Vermont, you are likely to choose a different mix of pasture species than for a pasture in Pennsylvania.

What does a high quality dense pasture look like? It should include a diverse mix of several different grass species as well as several legume and forb species. Forbs may include chicory, dandelion and plantain. This will allow a nice mix of vertical grass leaves and stems with the more horizontal legumes and broad leaf forbs. This creates density, which makes it easier for livestock to get a full mouthful in each bite. It also creates more leaf and stem surface area to photosynthesize and help the plant grow vigorously. When you stand in a high quality dense pasture and look down, you should see only plants with no bare soil visible between them.

Grass Productivity by Andre Voisin is one of several older publications I enjoy re-reading, as it reminds me that much of what we know about grazing has been around for quite a while. He used the term “rational” to describe good grazing systems. I enjoy his book because of both his technical information, and his obvious passion for the subject, which he expresses here along with a good description of what a well-managed pasture landscape should look like.

“What loveliness! What shades of colour all blending to form an even more magnificent picture where rational grazing is applied. The different paddocks, at different stages of re-growth, are not all of the same hue. Moreover, in a well-managed system the paddocks are not grazed in the same order as they stand, and so the colour tones, like reflections on the sea, do not gradually and uniformly diminish in intensity. Between two dark greens one glimpses a paddock lighter in colour, like the depth of a wave. A part where the grass has already begun to flower takes on an undulating, wavy aspect. What enchantment a pasture grazed in this way offers they eye!”

Setting up a grazing system part two: The livestock

Pasture height, digestibility and plant density control dry matter intake of grazing livestock. The best way to make sure the herd or flock is eating enough dry matter from pasture is to pay close attention to the quality and size of the bite of pasture they receive. If the pasture is too short, then they cannot get enough pasture in each bite to meet their dry matter needs, even if given a larger area to graze. If the pasture they are eating is too over-mature, and contains too many fibrous stems and not enough leaves, then it may not be digestible enough. This low digestibility can also limit their ability to consume enough pasture dry matter.

Cows and other ruminants can only take a certain number of bites each day and only graze for part of each day because they must also spend time resting and ruminating. This is one reason to provide a new pasture, which is fully recovered and dense, several times a day or at least every three days. When livestock go into a pasture that is fully regrown, they can rapidly fill their rumens with high quality feed. Managing for a dense pasture sward of the correct height results in better animal performance and a more profitable farm.

When ruminants graze, they wrap their tongues around pasture plants and snip them off with their lower teeth and upper dental pad. They generally first eat tender leaves and the tops of plants. If they are grazing the same pasture for several days or a week, the nutritional quality of what they eat each day will change due to this selective grazing behavior. So on day one they will get very high quality feed which takes them less effort to eat. Several days later in the same pasture the cattle are working harder and getting lower quality feed. Using a higher stocking density (smaller paddocks) and moving them to new pastures more often will result in more predictable pasture nutrient intake, which can make ration balancing and milk production easier to manage.
Don’t push them to graze it down too short. Leaving more plant residue provides better quality feed for the livestock. It is also better for the plants to leave more plant residue behind, and not push the animals to stay in the pasture too long and graze the plants down too short. Livestock will reject some pasture around manure. This natural instinct helps them avoid areas containing parasites. The best way to manage these rejected areas is to improve the biological activity of the soil and population of insects such as dung beetles, so that manure is more rapidly incorporated into the soil. Using a higher stocking density so that the leftover plant residue is trampled will encourage this decomposition activity.

For farmers who can’t use a high stocking density to get a thorough trampling effect, clipping pastures immediately after grazing may help manage rejected forage and standing residue, particularly in the first few years of grazing. Clipping with a mower and can be a useful tool for both weed control and mowing “straw like” over-mature grass stems so that regrowth at the next grazing is higher quality. When clipping it is important not to set the mower too low, and also important to clip as soon as possible after grazing to prevent nutrient losses from being flushed away.

Summary
Now that we have looked at things from the perspective of the plants and from the perspective of the livestock, we can see how each of their requirements complement each other. The plants do best with short periods of grazing and long regrowth periods. The livestock do best with short periods of grazing in each area and do best when the plants have had enough time to regrow. Good grazing management is a win-win system for the plants and livestock. And along the way there are many environmental benefits such as improved soil health. In addition, farm profitability can improve; the nutritional content of the meat and milk changes, and consumer demand for grass fed products can be met.

Sarah Flack is a consultant specializing in grass-based and organic livestock production systems. She can be reached at: www.sarahflackconsulting.com, 802-309-3714, or sarahflackconsulting@gmail.com.

Preventing Damage to Pastures
by Sarah Flack

Understanding how damage to pasture plants happens is another helpful way to learn about the important principals of good grazing. Overgrazing damage happens when a plant is grazed while growing from stored energy reserves rather than from active photosynthesis. Here are a few common causes of damage to pasture plants:
• Taking down interior fences in the fall and letting livestock “clean up” the pastures
• Allowing livestock access to pastures in winter when soils are thawed, causing damage to plant crowns and creating soil compaction
• Having a “rotational” system of 6 or 7 paddocks, with each grazed for 1 or 2 days so plants don’t have a long enough recovery period
• Leaving animals in a pasture for more than 3 days in a row so they have time to graze plants just as they begin to regrow
• Returning animals to the pasture before all of the plants have recovered
• Not adding additional acres into the grazing rotation when plant growth rates slow down

A Few Grazing Definitions
Dry Matter or Pasture Dry Matter is the amount of pasture after all the water has been excluded. This allows us to better understand how much actual nutrition there is in the plant material.
Dry Matter Intake (DMI) refers to the amount of feed the animal eats, excluding the water content.
Forb is a flowering plant in the pasture that is not a legume or a grass. In pastures this may include forage chicory, dandelion and plantain
Paddock is a small fenced area used for grazing.
Recovery periods refer to the amount of time the pasture plants are allowed to regrow or “rest” after each grazing.
Ruminants include cows, sheep, goats and other animals that have a rumen as part of a four-stomach digestive system.
Stock density refers to the number of cows per acre or pounds of animals per acre for just the short period of time that they are in an individual paddock. This is different than stocking rate, which refers to the total number of animals on the entire farm.
Stocking rate is the long-term carrying capacity of the farm or the total number of animals on the entire farm.
Managing Grasslands the Savory Way

by Phyllis and Paul Van Amburgh
The Agrarian Learning Center
Dharma Lea, LLC

There has been much talk in the last few years about pasture, grass, grazing, and grass-fed. You might say we are experiencing a sort of forage renaissance. Astute farmers want to know how to manage their grassland. They want to know how to become regenerative farmers. We have good news: the knowledge is already available to us. There is actually a glut of information, enough to keep a farmer busy researching for countless reading and Youtube-ing nights. And there is better news: there is also a way to make sense of this information, to organize it, and use it. The problem of degraded land has existed for thousands of years, but at least one man, Allan Savory, has dedicated his life to finding a solution and putting in place a simple, universal, framework for tackling what has become the greatest challenge humans have faced—ecosystem degradation. In many parts of the world this means desertification. In our part of the world it is low crop and hay yields, pests, weather extremes, and sub-optimal animal and human health.

Allan Savory is the father of Holistic Management (HM). He was born in Rhodesia, Africa, and in his early career he was a biologist, game ranger in the British Colonial Service, farmer, rancher, consultant, and wore many other “hats” before eventually becoming the international consultant he is today. All of his activities were driven by the same motive, which was to save his beloved bush, degrading before his own eyes, and in spite of all efforts, in and around what is now Zimbabwe. The bush, like many other places was wasting away in spite of common practices to save it including efforts like de-stocking, fencing out, or eradication of certain perceived problem species. He knew that these efforts were missing something. It was this drive to save the bush that led him to the discovery of what he calls the “key insights” and to develop the decision-making framework of Holistic Management.

Allan has always been a researcher, and Holistic Management is a compilation of his own work and experience, along with the work of countless others. Many of HM’s main concepts were adapted from work of the best thinkers -Albert Einstein, Jan Smuts, Masanobu Fukuoka, Andre Voisin, and many others. The knowledge that thinking in terms of wholes (whole systems, whole people, whole communities, whole ecosystems), and that all things are wholes within other wholes, rather than parts, is the key to managing complexity, and it came from the work of Jan Smuts. It is this approach, rather than a multidisciplinary or specialist approach, that bring success. His other key insights describe a “brittleness scale” that classifies landscapes by rainfall frequency and whether plant decay is largely biological or chemical; that the predator-prey relationship provides critical functions in maintaining the interdependence between plants, soil, and animals; and the fourth is that “overgrazing” is a function of time and not numbers of animals.

For more than 40 years Holistic Management (HM) has guided many farmers and ranchers and has revolutionized their lives. In 2009 Allan Savory and a small group of long-time Holistic Managers formed The Savory Institute (SI). This is the culmination of Allan’s insights at work. Rather than remaining in the theoretical, though, perhaps a look at some of the tools that were applied to the site we saw in the TED Talk might illustrate some of Allan’s insights at work.

Dairy Cows graze 7 year-old pasture improved by Holistic Management at Dharma Lea

photo by Phyllis Van Amburgh

Close up of mixed perennial pasture at authors’ farm, Dharma Lea LLC

photo by Phyllis Van Amburgh

- B-18 The Natural Farmer Winter, 2014-15 -
In that site the livestock were gathered into a single group and moved according to a plan that took into account seasonal rainfall, plant germination, the impact the animals’ hooves would have on the soil, and such. The animals’ hooves prepared the soil surface for germination when it was otherwise capped from lack of impact and had caused runoff and evaporation of rainfall. Predators were not eliminated but allowed to thrive, and human interventions such as the creation of overgrown enclosures also mimicked trampling and further prepared areas for rejuvenation. The animals were herded and moved along in a way that resembles the movement of the great herds and allowed for grazed plants to recover properly before the animals returned to the same spot. These and other factors and tools were used by the community within their plans of action for developing the place and life they desired. As the grass returned, water was retained in the soil and rainfall became effective and the water table began to heal. Relative humidity also improved and the weather climate were also positively affected. Biodiversity returned, returning carbon to the soil, and further improving plant growth and biodiversity. The animals were increased in number and their impact became greater, again improving the grass production with the execution of the plans. The description of this example is a gross oversimplification, but we can see that when the processes are understood, and the right tools are applied appropriately for a desired outcome, we have success.

About a year and a half ago, we attended a pasture walk guided by a Holistic Management practitioner, and it was this workshop that prompted us to go back to the books and computer to “brush up” on Holistic Management. It was during this research that we came across the inquiry for “Hub” applicants on the Savory Institute’s website. SI has recently launched a worldwide effort to restore the grasslands of Africa do not translate to North America. And while at first blush it seems that the application process, and were chosen as finalists from 90 applicants. We are now officially “hub candidates”, awaiting our final accreditation in the coming weeks. During our accreditation process we have continued our research of and training in Holistic Management. The refined, formal, implementation of Holistic Management is already having a remarkable impact on our farm and family. We have also begun working with other “Hubs” and Holistic practitioners around the world and we are astounded by the positive energy and progress that is being made. We have come to believe that the implications of agriculture, business, society, and the planet are profound.

As part of our SI affiliation process and partnering to develop a hub we traveled to London for their annual conference and then to Zimbabwe to visit SI’s first Hub, the Africa Center for Holistic Management, in August of this year. When we got to Zimbabwe we saw grassland rejuvenated and a host of positive rippling effects. When we got to Zimbabwe we saw grassland rejuvenated and a host of positive rippling effects. At the Africa Center, the herd of cattle, sheep, and goats has brought the grass back on much of the ranch. It has eliminated much of the encroaching brush, and provided crop sites for corn and grains. The ranch is now home to wildlife populations that hugely outnumber the neighboring “parks” that are designed to protect those same populations. Cattle and other livestock from the surrounding community members have been added to the herd, but more animals continue to be needed to keep up with the increasing forage growth. In the nearby Sizinda village, where USA Food Aid neaqustration to reverse climate change.

Each regional Hub will be an affiliation with local leaders to provide education, training, management and consulting services to practitioners, landowners, governments, and NGO’s to implement local solutions to land degradation, provide regional food and water security, and to boost community empowerment. We decided to “click” the tab for application to become a hub. From there, we entered a rigorous application process, and were chosen as finalists from 90 applicants. We are now officially “hub candidates”, awaiting our final accreditation in the coming weeks. During our accreditation process we have continued our research of and training in Holistic Management. The refined, formal, implementation of Holistic Management is already having a remarkable impact on our farm and family. We have also begun working with other “Hubs” and Holistic practitioners around the world and we are astounded at the positive energy and progress that is being made. We have come to believe that the implications for agriculture, business, society, and the planet are profound.

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After watching the creation of wealth and community in Africa, we pondered our context back home. We thought about the needs of our community. We thought about our culture. We thought about our farms. To be truthful, the two worlds couldn’t be much more different. We live in a digital, consumer society, where a lot of the time people don’t know their neighbors. Communities consist of people with similar interests more often than they do of people who live close to each other. Most of us don’t grow our own food at all. Of some we grow food for thousands of people. We use tractors because we have machines instead of laborers. But we all want a sustainable, future, a regenerative one. Consumers and farmers alike are forming a community along with any other organization or person that might help the effort to be careful about our land use. So this is our Context. This is where our Hub will begin its work - with the growing community of grass-based dairy, with our neighbors, with CSA growers - and it will grow quickly from there. But it will begin with a great effort in supporting the graziers of our region. And while at first blush it seems that desert grasslands of Africa do not translate to Northeast grazing, we should consider how Voisin’s work contributed to the development of HM.

It was the work of Andre Voisin that enabled Allan to fill in some of the gaps in his original framework.

Small Plot Farming Act – Changed the law to expand protection for farms as small as two acres
Raw Milk – With NOFA Promoting legislation to allow expanded sales of raw milk products
Food Safety – Advocating for size-appropriate, risk-based approach to food safety
School Nutrition – Helped pass state law ensuring access to healthy, locally grown food in schools
Defeated – US DOT Federal Motor Carrier Safety Admin. (CDL) requirement, hampering farmers, their families and employees to bring their products to market
Food Policy Council – Part of the Advisory Committee to help create a stronger, healthier Massachusetts food system
Meat Processing – Working to develop stronger infrastructure for local slaughter and meat processing

Building bridges between those who care

The State Agriculture Councils of The Humane Society of the United States seek to ensure that animal production systems are humane to animals and sensitive to the environment.

To learn more, visit humanesociety.org/agecouncils.
He had purchased Voisin's book, *Grass Productivity*, but had not given the work much thought at the time because he perceived it as irrelevant to the desertification of his beloved Rhodesia when compared to the lush pastures of France. It was in contemplating this difference later on, however, that he came to define the varying degrees of what he called the "bittleness scale" for land. Understand- ing this scale reveals critical insight for understanding the impact certain tools or practices have on any given landscape.

There were also concepts found in Voisin's grazing techniques that helped form Allan's Holistic Planned Grazing (HPG). Voisin had developed *rational grazing* (meaning well-thought-out grazing), in response to the link Voisin had discovered between overgrazing and time, and this has since morphed into "rotational grazing," the dangers of which Voisin himself spoke about vehemently. Mr. Savory says in his book *Holistic Management* that Voisin "would probably turn in his grave to see what has become of rational grazing." Too often "rotational grazing" becomes a set rotation that is mapped out and followed by moving cattle through the paddocks like clockwork. Without a Holistic Context and a system of Plan, Monitor, Control, and Re-plan, the land and cattle can degrade quickly. This degradation is the result of the "untorrid acceleration" that Voisin warned against.

Here in the Northeast USA we see many, many, farmers practicing what they call "rotational grazing." Some call it "mob grazing" or even "planned grazing" but far too many are using this tool (grazing) without the context of Holism. If we are going to provide for our entire farm along with the social, environmental, and financial needs, however, we must graduate to Holistic Planned Grazing. Rather than attempting to manage the land and animals with a juggling act of rotation, we must consider the whole. The whole consists of the farm with its soil, people, and animals, the culture, the society, and the economy, because all of these are indivisible from the land. This is done by articulating a Holistic Con- text and developing not just the HPG, but the Finan- cial and Land Planning as well.

When we plan our Grazing Holistically, we will plan "backwards," from recovery periods. We consider if the animals should be on the land, and if they should, we plan for them to be in the right place, for the right reasons, and at the right time. In order to do this we must gain some understanding about how our ecosystems function, and how to rec- ognize healthy water cycles, mineral cycles, energy flow, and community dynamics. Then we can use the Holistic Management framework to manage this complexity. It is quite easy, and in practice it is done in communities where the people are illiterate. It is only the change in paradigm that can be difficult.

In agricultural education programs we are taught to be good purchasers and managers, knowing which supplements and shots to use, which feed to buy and how to balance it. As grain and crops have become commonplace over the last many decades, much of the knowledge and practices that centuries of farmers had, including ecology and husbandry, were lost. In their place we brought in the grain scoop and a call to the vet or the tractor dealer for advice. But we have paid a great price for the conveniences of tractor farming and outsourcing. We have trans- formed most farms into mining operations where the fertility and resources have been harvested and sold, without the regenerative processes that used to accompany farm production. We are now faced with a huge ecological debt, and our practices generally have become absolutely dependent on purchased inputs. That is a dead end road for farming, and we all must be turned around. If we want to succeed, we must educate ourselves and regain the skills needed to replace purchased inputs and tractor-only farm- ing.

Of course we will still use tractors, grain, and crops, but we will begin to use them as tools, intentionally, with specific outcomes in mind that will enhance our triple bottom line and include the ecological, social, and true financial implications. We will need to eliminate the "throughput" paradigm based on turning around cash and purchasing inputs. When we do this, our land, our selves, our cows, our crops, our finances, and our community will all thrive. We need to take a good look at the whole system. "There is no wellbeing other than that which comes from sunlight and the green growing plants that grow from it on regenerating soils" (Allan Savory).

We need to work on our soil ecology, our plant systems, and their health governs the health of soil, food, weather, community, commerce, economy, and of course, the people of our world. Let's learn how to take care of it. By 2015 The Agrarian Learn- ing Center, our SI Hub, will be up and running. We will be available for consulting, coursework, pasture walks and seminars. You will find us then at www.agrarianlearningcenter.com. In the mean time, we can be reached at info@dharmaelea.com, or at (518) 248-9721.

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Rotational stocking requires pastures to be subdivided into individual grazing units called paddocks. The size and number of paddocks depend on the level of pasture productivity, stocking rate of livestock, and the desired residency period. Individual paddocks are grazed one at a time, in a planned order, with livestock occupying each paddock long enough to harvest the existing forage, but not so long as to allow grazing of regrowth to occur. After each paddock is grazed to the desired forage stubble height (which depends on the plant species and grazing prescription), the pasture is allowed to regrow and regain vigor before again being grazed.

In a well-managed rotational stocking method, the forage supply is constantly monitored and adjustments to the stocking rate made by increasing or decreasing the amount of pasture acreage grazed during a particular time period.

Generally, management costs for water, fence, and management are greater for rotational stocking than for continuous stocking. However, because it is easier to maintain an effective balance between forage demand and forage supply, rotational stocking methods generally promote higher forage yields, more uniform levels of forage quality, improved harvest efficiencies, and as a result, maximize livestock production per acre of pasture.

Another advantage of using the rotational stocking method is that by controlling the frequency and intensity of grazing, plant species which are capable of producing higher forage yields can be utilized. With continuous stocking, the taller more productive plant species tend to decline in productivity and abundance. With the rotational stocking method, these plants can remain productive and persistent for many years.

In most instances livestock should not remain on an individual paddock for longer than 7 days, with 3-4 days a more preferred residency period. The exception to this occurs with lactating dairy cows. In order to maintain consistency of milk production, they should not remain in one paddock for longer than 2 days, with a half day residency period preferred. Although there are no optimum rest intervals between grazing periods, it is recommended that during the most active growth periods of spring and early summer, once a paddock is grazed it should be rested between 15 and 20 days, and during the slower growth periods of late summer and fall between 20 and 40 days.

The rotational stocking method is planned around having enough forage available for grazing during the mid-summer period. As a result, during the spring there will be nearly twice as much forage as the livestock need for grazing. Hence, approximately 50 percent of the planned acreage should be closed for grazing during the first two months of the pasture season and the surplus forage mechanically harvested or grazed with other livestock accounted for in the planning process. Once the forage growth rates begin to decline and there is a need for additional feed, the entire planned acreage will become available for grazing.

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### Rotational and Continuous Stocking

#### The Use and Management of Rotational Stocking Methods

Generally, rotational stocking methods provide the greatest benefit for lactating dairy cattle and livestock with superior genetics for growth. These types of animals have the greatest need for large quantities of consistently high quality feed in order to maximize their genetic potential. Livestock operations seeking to maximize production per acre of pasture will also benefit from pastures grazed with a rotational stocking method.

In most instances livestock should not remain on an individual paddock for longer than 7 days, with 3-4 days a more preferred residency period. The exception to this occurs with lactating dairy cows. In order to maintain consistency of milk production, they should not remain in one paddock for longer than 2 days, with a half day residency period preferred. Although there are no optimum rest intervals between grazing periods, it is recommended that during the most active growth periods of spring and early summer, once a paddock is grazed it should be rested between 15 and 20 days, and during the slower growth periods of late summer and fall between 20 and 40 days.

The rotational stocking method is planned around having enough forage available for grazing during the mid-summer period. As a result, during the spring there will be nearly twice as much forage as the livestock need for grazing.

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### Rotational Stocking Method

- High Forage Supply (Spring and Early Summer)
- Low Forage Supply (Mid-Summer and Fall)

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Continuous Stocking

The continuous stocking method is a method of livestock deployment where livestock have the continuous or uninterrupted use of a unit of pasture throughout the time period in which grazing is allowed.

As commonly practiced, the continuous stocking method can be described as a minimum management practice. A set number of animals are turned out on a given number of acres of pasture and allowed to graze for as long as the forage supply lasts. Although development costs for water and fencing are low with this method, it is extremely difficult to control the grazing events, and thus, it is nearly impossible to maintain an effective balance between forage demand and forage supply. When stocking rates are set too high, animal nutritional requirements are not met and individual animal performance is reduced. When stocking rates are set too low, forage is wasted and production per acre is reduced. In either case, the result is often a highly variable forage quality and an inefficient conversion of forage into a salable product.

Generally, the continuous stocking method is not very productive in terms of liveweight gains per acre or in maximizing the length of grazing season. However, as long as there is an adequate supply of forage, gains per animal are often equal to or greater than those obtained from more intensively managed rotational stocking methods. This is primarily the result of selective grazing.

When provided with a surplus of forage from which to choose, grazing animals have the ability to select a diet that is higher in overall quality than the average quality of the pasture. In other words, they select the best and leave the rest. Unfortunately, the forage that is left behind is wasted, and it is this non-utilized feed that accounts for the reductions in liveweight gains per acre and length of grazing season.

Another problem with continuous stocking is that over time it can weaken or eliminate many of the more productive plant species. Forages such as birdsfoot trefoil, red clover, alfalfa, bromegrass, timothy, and orchardgrass do not survive well under close continuous grazing. As a result, pasture yields are often reduced along with a loss of quality.

The Use and Management of Continuous Stocking Methods

Because of the increased amount of wasted forage associated with the continuous stocking method and the highly variable forage quality, it is not recommended for livestock operations where maximizing production per acre is the primary objective or for livestock possessing high genetic potentials for growth or milk production. However, for many livestock operations where the forage supply exceeds the forage demand, and there is no demonstrated need for the surplus forage, continuous stocking may be the most appropriate method or all that can be economically justified.

An improved management strategy for increasing the harvest efficiency of pastures which are continuously stocked is to alter the number of grazing animals in response to the available forage supply. This is generally described as a “put and take” style of grazing management. Although pastures that are managed using this strategy may be continuously stocked during the period of time in which grazing is allowed, the forage supply is constantly monitored and adjustments to the stocking rate made by increasing or decreasing the number of grazing animals in response to the available forage supply.

In the spring of the year, pastures should be stocked with approximately twice the expected summer stocking rate. As forage growth rates slow in midsummer, the stocking rate should be reduced by at least 50%.

This method is particularly effective if there are haylands available which can be grazed after the first cutting of hay is taken, or when animals of different age classes are grazed together and some of the animals can be sold, placed in feedlots, or in some other manner removed from the pasture.

With the continuous stocking method, there are always some livestock present on a pasture during the time period in which grazing is allowed. As a result, there is very little opportunity to directly control the frequency and intensity of grazing events. Therefore, it must be done indirectly by establishing grazing height guidelines. During the grazing period, the height of the forage should not be allowed to exceed six inches nor decrease to less than three inches.

Another use for the continuous stocking method of grazing is where the prescribed grazing objective is to weaken or eliminate a particular plant or plant community. By overstocking a unit of pasture and grazing with the continuous stocking method, grazing and browsing animals can harvest vegetation with a frequency, intensity, duration, and timing that is not conducive to its continued survival. Once the plant community is weakened or suppressed, the pasture can be over-seeded with a more desirable plant species.
Grazing Success Through Observation and Planning at Bishopp Family Farm

by Jack Kittredge

Agriculture is still one of the largest industries in New York state. It contributes 5.7 billion dollars to the economy each year, and occupies almost a quarter of the state's land area. That importance is obvious as one travels through central New York along the Mohawk River and the route of the old Erie Canal and sees the gently rolling hills, large fields, and occasional barns and farmhouses.

Troy Bishopp is privileged to be a fifth generation farmer at one of these farms, Bishopp Family Farm in Deansboro, southwest of Utica. The farm, once a dairy operation like so many in New York, boasts 101 acres – most of them lush pasture sitting on a limestone hillside. Several springs in the middle of his land have been piped to fill tubs that water animals, providing an excellent year-round gravity fed plumbing system. The paddocks containing the tubs are left open so that animals in nearby paddocks can always have access to water.

With 20 years of experience grazing cows, Bishopp was hired by the county Soil and Water Conservation District as a grazing specialist. He talks, writes, and dreams about grass, and is working to be the world's best grass farmer.

One of techniques he uses is meticulous record keeping to help him build soil organic matter in his pastures. You can see some of his careful work on the aerial photo of his land, on which he has superimposed yellow lines showing the high tensile boundary fence, red lines showing the paddocks, and yellow lines describing the land, giving paddock acreage and listing percentages of organic matter in 2008 and 2011.

“In 2008,” he says, “when we started doing planned grazing and keeping good records, we took soil samples. Those numbers are in black on the map. Then in 2011 I took samples again to see if the mob grazing, longer rest periods, hay out on the land, rolled bales, and other things I did had made a difference. Those numbers are on the map in yellow. Just a week ago I took new samples for 2014 and I’m interested to see how the farm is doing.”

Right now Troy is grazing animals on contract for people who don’t have enough land of their own. Besides his own acres of pasture that are divided into 20 paddocks, he rents another 60 acres locally – divided into 7 paddocks. These he grazes in later, intense bursts with long recovery periods. In the winter he feeds hay once the snow and ice make it impossible for the cattle to get at the grass. This hay he buys in, but charges the owner reduced prices and contributes a major resource for building his land’s fertility.

“I have those soil tests in all my paddocks,” he relates, “so I know where to have the cows when I feed that hay. It will bring the fertility up. I’ve been grazing these fields for 18 years and I’d like to double my organic matter. Over the whole farm it averages 46%. Near the barn, is where all the manure was spread by my grandparents when this was a dairy, so that is where the high fertility is. Those fields are pushing 50%. Organic matter. At the top of the farm, on the hill where they grow rice is, it is more like 4% – but it is used to be 2% or 3%. We were always saying ‘It’s easier to spread closer’ and weren’t in the mode of thinking of growing grass as our main goal. I started thinking that way when I got into holistic management. I woke up then and we started outwintering, bale grazing, stockpiling.”

With his new soil tests Bishopp wants to find out the results of all his efforts at mob stocking, fallowing, managing and sending that hay back into the soil. He paid special attention to field six this year – cutting it into 6 strips so all the cows were concentrated on just one-sixth of the field each day. His goal was for them to eat grass, sure, but also do a lot of trampling, to get soil/seed contact and bring up the organic matter in the soil. But in other fields he shoots for more eating and better animal performance.

In 2008, Troy had his own cattle, but eventually sold them. Then he had a client who raised beef and counted on Bishopp to grass-finish the animals. But that client died.

“Now I’m a contract grazer,” he says, “That is our claim to fame. This is a grass farm. My reputation is what makes things roll. We’ve graze every kind of animal. I’ve had conventional heifers here from a CAFO farm, but today we’re grazing organic dairy heifers – I’m certified organic by PCO (Pennsylvania Certified Organic). Tomorrow it could be beef, or anything. We have morphed in various directions as we needed to. I have a standing order. If something bad happens, I pick up the phone and I’ll have customers.”

The heifers currently on the farm come from an organic dairy in Pennsylvania. Troy has been working with that dairy for three years. They don’t have enough land and were feeding hay as early as October because they ran out of pasture. Using Troy’s land is a way they can keep their animals on pasture longer and feed less hay, for a significant cost saving. Bishopp will ship the heifers back to Pennsylvania in January before their March calving date, and on the return trip will receive a load of 55 to 60 weanings. Next year these heifers will have been on grass until the trip, but are on hay at his farm for three months. They are only half the size of the heifers and therefore eat half the hay.

Troy is pleased with the contract grazing arrangements.

We’re following a program with these heifers,” he explains, “and it is working well for both of us. I’m working with organic milk companies that want to have grassfed milk and they want the grass utilized even farther into the season. I charge $1.20 per head per day. If I graze 60 head at $1.20 a day I’m making $72 a day. So for ten minutes I come up here, move the fence, walk away, and get $72. That’s not bad. Of course, there is a heck of a lot of planning that goes into doing extended grazing.

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“Then in the winter,” he continues, “I charge around $1000 a month to get out of bed, start the tractor, and feed the hay. That comes from another certified organic grower. Everything is paid for by the guy in Pennsylvania. I’m essentially a paid babysitter. I have to make sure the cows are healthy and if there are problems I have to deal with it. But he pays the vet bill, if needed.”

And, of course another benefit to Troy is the hay he gets trucked in from another farm. He figures that in each ton of hay there is about $50 of fertility – organic matter and nutrients. His goal is to increase fertility and if he can do that in part with free hay, great. He made the mistake a couple times of making hay on halves. It was his land and he would get half the hay, but the other half got shipped off. That was his fertility leaving his land! The way to stay ahead, he figures, is to always be bringing in fertility. He sends some off on the backs of these animals he ships out, he admits. But he says you need to figure in the cost of replacing those nutrients.

“Part of Holistic Planned Grazing,” Bishopp explains, “is that you plan your fields individually, as a whole. So you try to get the maximum fertility on your low producing fields – you feed hay there, then let livestock graze. You also pick a fallow field where you spread all your manure and let everything there grow like prairie. Then you finally use it when you go on vacation. If there is enough feed there by then that it is four or five feet tall. When we do that we strip graze it and the cows eat all the seeds and understory and pulmc the rest into the ground. Then my dad comes up and mows it so it is really great grazing when the grass comes back.

“There are a thousand ways to graze this land,” he continues. “You could cut it up more, or into quar ters or halves of paddocks. You could just open the gate and let them graze it all. It depends on what you want. If you want to go away, let them graze a
This chart shows Bishopp’s grazing plan for 2014, and the way it actually worked out, paddock by paddock and day by day. Combined with the aerial photo of the farm, these tools provide a close look at Troy’s land management strategy.

To help him plan his grazing for the coming year, Troy uses a grazing chart. The paddocks are listed down the side, first the home 20, then the rented 7. Across the top are the months, divided into groups of 5 or so days, with each small vertical line being a day. There is also room on it to note things like rainfall, manure spreading, planned days away, etc. Each X is what Troy has planned for grazing that day. Before a group of Xs starts in a paddock, he writes the number of days that forage has been growing back without grazing. Each cell filled with green is what was actually grazed. So he planned to get some grazing done in early April in paddocks 4, 5 and 6. But did he get the cattle grazing until mid-April? Most of his planning, however, was right on.

“So all this grass has been stockpiled and is sitting here since August. It is very healthy and when spring hits, the grass is strong. As soon as it is decent weather he can put stock out and he ends up usually two to three weeks ahead of everyone else.”

Troy says his organic certifiers love the chart. It is a great verification tool. He has it on his website <thegrasswhisperer.com> to get grazing information out to the public.

Troy is into what he calls ‘stockpile grazing’. The grass in most of his paddocks has been resting for 60 to 130 days, to be grazed until early January. It’s on the ground and is like having money in the bank. But managing it is all about the weather. He knows how much feed is there on the ground and can calculate how much the stock is going to eat. But even now, the cost and the snow freeze on the ground and keep them from eating what is there.

So that is 20 more days of growth. The grass has been sitting in those fields growing all summer. We will graze if off now, but it will still be healthy and grow more grass in the spring. I haven’t done anything input-wise. All I am doing is managing the animals according to the growth rates I see in my pasture. I’m working with nature.”

The problem for most people in grazing, he says, is they have too many cows. Using his system you can calculate how much feed you have and how much you can produce. That will then tell you the number of animals you can support. But another consideration in a dairy operation is that the animals are always short of energy, not protein. On average a dairy animal only wants about 16 to 17 percent of protein in their diet, and that is already in most forage. So you need to manage your sward accordingly.

In Holistic Planned Grazing, Bishopp adds, you use some mechanical tools. One is a bush hog mower. Troy goes in after the cows are out to cut the weeds that the cows didn’t eat. If he does a really good job grazing, he says, he doesn’t have to mow – he’ll manage the animals to eat and trample what he wants. Sometimes if he wants to get rid of a particular weed he will wait until it has gone to flower and seed – that provides a source of food for the bees. Then he’ll mow it because at that point the least energy is left in the roots.

Part of Troy’s strategy in the fall is to get the cows off the top of the hill before the big snows hit. Those are paddocks 10, 11, and especially 12. If there would be a hard winter storm with them there, he’d worry about their exposure. He’d worry a lot less if they were halfway down the hill where the winds aren’t so strong. So his plan is to get the top grazed off before December. It took about 120 days to make the grass in those paddocks, and that resource has to be managed.

“You can’t just let them have the whole thing,” he insists. “They will shit on it, walk on it, they won’t eat it efficiently. It would be like putting a bunch of hay out without feeders and they would just wreak it. So if I want more efficiency I move them more often and give them a smaller area to graze. You get a better manure distribution.”

During my visit Bishopp was strip grazing paddock 12 to make it more efficient by cutting it into 6 strips with portable fencing. Unfortunately, about half the herd somehow got past the portable fencing.
and was grazing an area reserved for later. I watched Troy deal with getting them back together in the right area.

He was pretty calm: “The cows are out of the strips I set up! I wonder how they did that. This is not good at all. They’re not where they are supposed to be. They’re supposed to be in the strips so they graze one strip each day until they get to the top of the hill. I’m not very happy right now. I’m going to have to get them back to where they were.”

Fortunately, or perhaps born of the wisdom of much experience, he had turned off the fencer at the barn before we drove up to the top of the hill. So he proceeded to take down enough strip fencing to make a way for the cows who had somehow gotten past the fence line to come back.

“Around the perimeter of the farm,” he said, “is a three strand high tensile fence so I’m not worried about cows getting out onto other people’s property. Hear those cows that got into the wrong strip -- they’re not happy. They want to be with their buddies. That is a way for me to manage them. I want my animals under my control, not going where they choose.”

Once the strip fences were down, the trespassing cows quickly returned to the others in the proper strip and Troy reset the fences. The whole thing took maybe 15 minutes.

“I have a full time job,” Bishopp observes, “and this normally takes me 10 minutes. It pays well for that, even if it took me 15 today! I like it up here, too, sometimes I’ll have a beer. It is exciting. How many people can feed 60 animals in 10 minutes?”

Bishopp feels strongly that you need to let your pasture go to seed occasionally.

“If you graze without adequate rest,” he insists, “you never let your grass go to seed. There used to be this mentality to always graze it at 8 or 10 inches and never let it get a seed head. But that is not really the right approach. I need seed heads in certain fields. You have to rotate so each field gets to reseed itself. If I manage my pastures to reseed themselves, I don’t have to buy seed and do it mechanically. Maybe if we bung up and let a pasture get muddy, sure we can throw seed in there. There may be reasons to reseed your pasture, but on this farm if we manage correctly they will reseed themselves. Farming is about money and management. If you don’t have money you can’t pay your taxes or even keep your farm.”

Troy rations out what forage he wants the herd to eat in a day. If he has calculated it right, he says, they eat what he wants and leave what he wants.

“There is a certain amount of dry feed equivalent in a pasture,” he explains. “If it is fairly dense there are about 300 pounds of dry feed per inch of height in an acre of growing forage. There are almost two feet of forage in this paddock here. So, conservatively, if there are 16 inches of grazeable grass here, times 300 pounds per inch, that is 4800 pounds of dry hay equivalent in an acre of this ground. This herd will eat 3 to 3½ % of their body weight in feed per day. If they each weigh 900 pounds they’ll eat 32 pounds or threadabouts of feed. A herd this size, 60 animals, will eat 1800 to 2000 pounds of dry equivalent per day. So that 4800 pounds per acre, divided by the amount they need per day, 2000, gives you a number -- 2.4 -- of days they can be on an acre at this height.

“Generally,” he continues, “I figure for grass at 12 inches this herd can eat down roughly 0.6 acres a day. This strip is 300 feet wide by about 80 feet. That is 24,000 square feet, somewhere in the vicinity of 50 to 60 percent of an acre, give or take, so it is about right for a day. I’d call this a dense pasture. If you can’t see the ground then you have a lot of
Troy shows off some of his dense pasture grass.

forage and it is dense. If it is not as dense then maybe you can’t give it as high a score and you are at 250 or 200 pounds per inch. Maybe you have only 10 inches. Then you have to give them more area. It is all relative.”

One of the things Bishopp stresses is the value of diversity in the plant mix. Diversity gives you growth no matter the season, or whether it is wet or dry, warm or cold. But diversity is also crucial as grass will provide certain nutrients whereas forbs and other plants have different chemicals and minerals to enable a more diverse meal. Instead of going to the salad bar and eating only lettuce, he wants the cows to get a whole salad!

“I’ve been doing this 20 some years”, he says. “I can look at this pasture and say ‘Yeah, there are so many pounds of feed in there’. I know what I’m doing. But now that I’m a teacher I’m trying to tell people how I do it. I want to be the world’s best grass farmer. I want to sequester carbon, I want to sequester water, I want to build organic matter. I want to be the best -- and that keeps me driven!”
The seasonal pattern of forage production in cool-season forages.

50% of the yield is produced during the first 2 to 2.5 months, the remaining 50% is grown over the last 3.5 to 4.0 months.

Root volume and leaf tissue exist in a co-dependent relationship that is best described as what happens to one directly influences what happens to the other. Roots and root hairs provide the conduit by which moisture and dissolved nutrients enter the plant where they can be used in the synthesis of leaf tissue. The photosynthetic activity of the leaf tissue provides the carbohydrates used in the production of roots. It is generally the case that plants maintain a dynamic balance between root mass and leaf volume. In other words, when there is a large volume of one there is a large volume of the other. Conversely, when there is a low volume of one, there is also a low volume of the other.

This is because the leaves produce the carbohydrates for root growth. Without a large volume of leaves, there is no source of energy to keep a large root mass intact, thus it dies back to a volume that can be supported by the amount of green leaf present. Thus when a plant is defoliated to a low volume of leaf tissue, either through grazing or mechanical harvest, roots stop growing and slough off proportionately.

Over time, frequent close defoliation - as encountered in pastures that are continuously stocked - not only reduces the amount of leaf tissue produced, it also causes a decline in root mass. Subsequently, this reduces the plant’s ability to extract moisture and nutrients from the soil, which in turn reduces its capacity for growth even though adequate soil moisture and nutrients may be available.

This same phenomenon occurs even when pastures are grazed using rotational stocking methods. However, unlike pastures that are continuously stocked, the plants have the opportunity to recover - not only in leaf tissue but also in root mass - before they are defoliated again. Thus even though leaf tissue is removed and there is a commensurate reduction in root mass, when provided with adequate recovery periods, plant productivity can be maintained at high levels.

The vast majority of plants found in pastures in the Northeast region of the United States (U.S.) are cool-season grasses, legumes, and forbs. These plants begin growth in spring soon after snowmelt and are most active when soil temperatures are in the 40 to 60 degree F. range. Root growth begins at cooler temperatures than shoot growth. With the increasing soil temperatures of summer, growth slows. However, once fall returns and soil temperatures begin to cool, growth rates pick back up. This change in growth rate over the growing season produces a distinct seasonal pattern of production in most all cool-season grass and legume pastures such that about 50% of the seasonal growth occurs during the first 2 to 2.5 months while the remaining 50% is produced over the remaining 3.5 to 4 months.

It is important to understand the relationship between pasture growth rates and the seasonal pattern of forage production because even though growth rates and yields are highly variable during a single year, as well as from one year to the next, the general pattern of production is fairly predictable. And knowing the general pattern of how fast plants are growing and when establishes the basis for logically planning systems of grazing management that promote high forage yields, enhanced forage quality, increased harvest efficiency, and optimal animal performance.

It is also important to know how plants grow and respond to grazing. Because controlling - through management - the frequency, intensity, timing, and duration of the grazing events so that optimal plant growth can occur is vital to attaining optimal dry matter yields.

For example research conducted at Cornell University demonstrated the influence of grazing management on the productivity of pastures having the same soil type, fertility status, and plant species composition. Pasture treatments included a 16-paddock rotational system where cattle were moved to a new paddock every two days, a four-paddock rotational system where cattle were moved every seven to ten days, and a season-long continuously stocked system. Potential hay yields for the soils on the project were 7,500 to 8,000 lb/ac/yr. However the only grazing system that allowed the pastures to produce as much forage as the site was potentially capable of producing was the 16-paddock rotational system. Conversely, the continuously stocked pasture produced less than half of the site’s potential forage yield.

### Connected and Dependent Parts

A pasture plant can best be described as a living system comprised of two connected and dependent parts. The above-ground leaves and stems are solar collectors that, through photosynthesis, during the spring and summer convert light energy into carbohydrate energy for tissue growth. The below-ground roots and root hairs extract moisture and dissolved nutrients from the soil. Some 90% of plant growth is directly related to photosynthetic activity in the green leaves and stems, with the remaining 10% of growth related to the function of roots, root hairs, and stored carbohydrate reserves. While 10% does not seem like much, it can be argued this is the first 10% of growth, without which the other 90% never happens. Keep in mind, a plant without water is not much different than a fish out of water; they both simply bake in the sun.

Nearly 90 percent of pasture growth comes directly from the sun shining on green leaf. The remaining 10% of plant growth comes from soil fertility factors and moisture.
he amount of stored carbohydrate energy the plant would use to initiate regrowth. Collectively, these two influences slow plant recovery and production.

Biological Growth Response

Pasture plants grow at different rates at different times during the season. They also grow at different rates during a single growth cycle. There is an early slow growth period, a mid-rapid growth stage, and a late mature phase characterized by a decline in growth rate. Each time a plant is defoliated, its rate of growth passes through these three phases, taking different amounts of time depending on the time of year.

In phase one, the plants are leafy and immature, high in quality, low in volume, and as a result of the lack of leaf area, growing slowly. In the second phase, growth rates are at their highest, the plants are leafy, growing toward maturity, and high in both quality and volume. In the last phase, the plants become stemmy and over-mature, grow slowly (if at all), yield is highest, but quality is at its lowest. During spring and early summer this phase is charac-

Controlling leaf-area removal and providing adequate recovery periods between successive grazing periods allows plants to remain in a vigorously growing productive condition.

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Dairy Farming Without Grain

by Sarah Flack

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Growing demand for grass-fed dairy products is encouraging more farmers to try zero grain rations. Organic farmers are now paying a premium for this “Grassmilk.” In addition, some dairy farms direct marketing raw milk or farmstead cheeses are interested in zero grain dairying.

But zero grain dairy farming is not easy to do, which is why there are still a relatively small number of farms doing it successfully. Some of the successful zero grain dairies transitioned to zero-grain 7 to 10 years ago, and continue to find it works well for them. Other farms made the transition to zero-grain much more recently, due to financial pressures caused by high grain costs and in some situations, due to unpaid grain bills. This year, there are more farms transitioning to zero-grain so they can get the organic “grassmilk” premiums. Back in the 1990’s, there was also interest in zero-grain dairy production. Some of those farms, along with farms trying it today, found it worked for them, but others found that their cows did not do well, and that milk production was too low to cover farm overhead costs.

So what are the most important management issues for farms considering a zero grain dairy ration? Why have some farms found it worked well for them while others didn’t?

There are a lot of different management systems on farms that are succeeding with feeding zero grain. So there is no simple recipe for success. They are, however, some key principles for zero grain management. These include having the right herd genetics, making and feeding a large quantity of high quality forage; monitoring body condition and reproductive performance; and making sure that the amount of milk made by the herd will bring in enough income to cover farm expenses.

Forage must be of high quality. This needs to include digestibility levels as well as energy and protein content. Often the limiting factor on the forages, which is why some farms use molasses as a feed supplement. In addition, once all the grain has been removed from the ration, the cows will need a much larger quantity of forage. So many farms have had to either add on additional land or reduce the herd size.

During the grazing season, many farms feed some stored forage in addition to giving the herd larger paddocks and allowing them to “waste” some pasture. This allows reduced much pasture dry matter into the cows as possible. The extra pasture left behind can either be trimmed on farms using high density stocking followed by the leaving of the forages, which is why some farms use molasses as a feed supplement. In addition, once all the grain has been removed from the ration, the cows will need a much larger quantity of forage. So many farms have had to either add on additional land or reduce the herd size.

One additional strategy that some farms are using is to milk the cows only once a day for part of the lactation. This is done to try to get the cows to use less energy making milk when the forage quantity or quality may be too low.

Conclusions

Overall it is clear that success with zero-grain dairy rations requires managing forage dry matter intake. However, the approach that each farm is taking to do that varies greatly. So although there are some basic management practices such as good genetic selection and feeding a lot of high quality forage, there is no simple recipe as to why some farms and it works and others don’t. Each farm will need to find their own “best” system, and some farms may find that it is a good match for them.

Summary of suggestions from zero-grain dairy farmers:

• Make sure that the amount of milk to be produced is the same or slightly higher than the previous year.
• Make sure you have enough land for increased forage production.
• Monitor body condition to make sure the herd isn’t losing too much weight.
• Select for the right herd genetics.
• Make sure that the level of milk production you expect to make with no grain will bring in enough income to keep the farm financially sustainable.

I’d like to thank NOFA Vermont for funding my visits to zero-grain farms in Vermont during the summer, and also thank the many dairy farms I have visited in the last year in NY and VT. Farmers’ generous sharing of challenges and successes of transitioning to zero-grain systems will help other farmers be able to make informed decisions on how to make the transition successfully, or determine if zero-grain is a good match for their farm at all.

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Other Important Considerations

from “Managing Pasture as a Crop” by Darrell L. Emmick, Ph. D.

When a prescribed grazing management plan is being developed, there are several important factors to consider.

Water

Water is an extremely important part of a grazing plan. The grazing plan needs to be designed to allow the livestock to use the forage in a manner to get the maximum benefit from the forage. Water is an extremely important part of a grazing plan and the more accessible it is to the livestock, the better. However, this does not mean that every paddock requires a separate water tank. In some cases a tank can be placed in a fence line and serve two or more paddocks, or with some creative fencing, one source of water can supply the entire planned acreage. In addition, by using a main water line with plug-in points and a 100-foot garden hose, stock tanks can be placed in different locations within paddocks to thus greatly reduce grazing losses and mud. The primary concern is making sure that water is available to the livestock at all times and that it is of adequate quality and quantity. Grazing management systems for lactating dairy cows should include a source of water at least every 300 feet. Other classes and kinds of livestock should have a source of water at least every 1,000 feet.

Shade

Under normal northeastern conditions, there are but a very few days during a summer when the lack of shade would be a concern. In fact, providing shade for lactating dairy cows may do more to harm milk production than to help. Livestock are a lot like people in that sometimes things are done, not out of necessity, but out of desire. When a lactating dairy cow stands in the shade on a 75-80 degree day with a cool breeze blowing, it is not because she needs to cool off because it is too hot. In fact, she is standing in the shade she is not eating and, as a result, milk production is reduced. However, during those few days when temperatures exceed 85 degrees and there is little or no breeze blowing, dairy cows can still graze mornings and nights. During the heat of the day they can be put in the barn or on a pasture with shade. For other classes and kinds of livestock, having them in pastures with shade and water on the hottest days is all that is required.
Shape of Paddocks

Livestock like to cruise fence lines to locate their boundaries or escape points. In doing so, a greater amount of forage is trampled and wasted through deposition of manure and urine. To help reduce these impacts, paddocks should be as square as possible. Rectangular paddocks are also acceptable as long as they are no more than four times as long as they are wide. Although other shapes can be used, in particular when fence lines have to follow natural land forms or boundaries, the use of circles, triangles or other odd shapes should be kept to a minimum. Keep in mind that just because a fence is already in place does not mean that it is in the best place.

Paddock Orientation

Forage growth rates, forage availability, and forage utilization are all impacted by, among other things, differences in forage type, topography, and soil suitability. As a result, paddocks need to be oriented in such a manner that variability is kept to a minimum. In other words, a single paddock should not include steeply sloping hillsides with hilltops and flatlands, soil types that vary significantly in suitability due to wetness, stoniness, inherent differences in fertility, etc., or forage species that differ greatly in growth or yield characteristics. Also, paddocks should not be oriented up and down hillsides. In particular, if the water supply is located at the bottom of the hill, livestock will tend to overgraze the lower slope and undergraze the upper slope. As a result, whenever feasible, paddocks should be oriented on the contour.

Gate Location

Gates need to be located so they do not interfere with the natural movement of livestock as they travel to and from the barn or water. Generally, gates should be located in the corner of the paddock that is closest to the direction the livestock need to travel. If they are not, although some of the livestock will find their way out of the paddock, there will always be a few that will end up trapped in a gateless corner trying to figure out how to destroy a fence.

Laneways

Laneways should be constructed so that livestock can be easily moved from one paddock to another, to the water supply, and to the barn or other facility. If the laneway is just for livestock movement, it need not be more than 10 feet wide. However, if the laneway is required for machinery access to the paddocks, it needs to be wide enough (especially at the gate openings) to get your largest harvesting or other machinery through. In heavy traffic areas, gravel, shale, crushed limestone, concrete, or other substrate may have to be utilized to prevent livestock from turning the laneway into a wallow. If necessary, a culvert pipe may be needed or a bridge built. Being able to get livestock to the pasture is as important as producing the forage in the pasture.
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Troy Bishopp, New York grass farmer, prepares to set stakes to strip graze 60 bred organic heifers in one of the 20 paddocks on his 100 acre hillside. Notice the quality of his grass and how contented the cattle are.