

Agroforestry and Permaculture: Using Livestock to Restore a Native Forest **By John Henry Hite III**

Part 1: Horse Logging

Chapter One: ANR 100 (Intro to Agr. & Natural Resources) Lab

John Henry Hite III (John): The purpose of the project is to show both individual community members and students alike a way that you can manage a piece of property in a restorative fashion and a sustainable manner. The objective is to take a piece of property that's typical of the Appalachian region and use concepts that I learned throughout my education at Berea College and throughout my time as a farmhand and other things I've done, to make a piece of property better both for the ecosystem and better for myself, as an individual, or, in this case, the college.

Chapter Two: Tree Selection

Clint Patterson (Clint): Okay so we're following along the edge of a treeline here. There's young timber over here, older timber over here. This used to be a field edge, pretty apparent. The trees are mostly leaning out over the field edge. So it's pretty easy right here as far as selection goes, we want to take trees that are leaning out. We want to take trees that have butt Damage like this, probably a result of fire at some point. Even though black oak isn't really very valuable now, it's a good time for us to cut it anyway because we're sawing black oak and red oak for stall wood in the new barn. I'm going to select this tree. This is how we mark them. At least two marks, I usually try to do uphill and downhill. If it's a really big tree or I know we'll be coming from a certain direction I'll mark it accordingly. I think I'll put one here because I know we'll be coming from that direction and will be able to see that spot. Another thing that we do, it's not necessary for us, cutting it ourselves, but this is a precaution for timber theft, to put a spot on the stump below where the cut would happen. That way, unless the timber buyer's really slick and has a can of paint the same color as yours, you can quickly surmise that it was marked or not marked based on that stump spot.

The little black oak that I marked is severely overtopped and you can see from this angle, it's just got two limbs that are bent way over trying to get sunlight. It's lost its other two main limbs due to lack of sunlight. So that tree is a goner, it's still got a couple tie logs in it, so we're going to go ahead and get it before it bites the dust.

We're thinking more about what we're leaving really than what we're taking. We're kind of cleaning up the woods. This is about 26" diameter, it's got...this is a sign of amillaria root rot, I believe, a well-developed weep there. It's probably got heart rot, swelled up, leaning. I wouldn't be surprised if it's no good up to about this high.

John: There's a classic widow-maker. A big potential danger when looking at cutting timber. Keep your head on a swivel of what's above you. Once you start cutting on the tree or hammering on the tree, putting wedges in, shake it loose, it could fall and injure somebody. It's always a consideration you have to take.

Clint: A good learning example right there, thanks John.

Sometimes even just the vibrations the saw cutting it can shake a limb loose like that. It doesn't look very big but falling from 40' feet up, that can get you even with a hard hat.

Chapter Three: Tree Felling

No dialogue

7:08–**John:** How far out do you think I should go?

No dialogue

7:24–**John:** I'm gonna leave that good part.

No dialogue

Chapter Four: Tree Extraction

No dialogue

Part 2: Invasive Species Removal

John Henry Hite III (John): We'll be using goats to graze invasives off of a riparian zone next to a creek so that we can remove the majority of the leafy foliage that are on the invasive plants and allow us to easily get in to cut and treat stumps of invasive plants. These invasive plants are things such as autumn olive, bush honeysuckle, asian honeysuckle, burning bush and things of that category that are very common in the Appalachian region that come along with large-scale disturbance. We want to remove those invasives and clear it with the goats.

This particular part of the project is a practical component because when removing invasive species it's a lot of hard, manual labor work where you're cutting and removing the leafy matter out of your way, treating the stump. But all that stuff takes up area and it's all green, it's very hard to see what you're working on, how you're clearing land. So what you can do is graze it with the goats, which allows your goats to grow and benefit, gain body mass, which in an agricultural system is the most important thing; we want to raise animals and put weight on them. But at the same time you're clearing away the nuisance of having to fight the foliage while you fight the invasives. With repetitive introduction of goats on the same site, you can repress the invasives so that natives can overtake them, but in this case, we are going to graze the invasives, remove the main stump, treat the stump through stump treatment which allows us to use a minimal amount of herbicide and keep our creek safe while we do it, and essentially kill off the invasive species. The alternative option would be to use something like a foliar spray where you have to spray a very large quantity of herbicide on a plant to try and eradicate it and it may leak into our watershed and get into the stream that we're working by and we don't want that. So we are going to use stump treatment in conjunction with the goat grazing to reduce the amount of herbicide necessary and reduce the amount of physical labor necessary while

reducing the invasives. By doing this project, we are going to be able to educate students, give real life skills on how to manage land, use equipment, and work with animals to students in the departments such as Biology and Agriculture.

Chapter One: ANR 110 (Animal Science) Lab

Dr. Quinn Baptiste (Dr. Baptiste): Managing the animals means we pay attention to their behavior, we set up environments that work for them, but then, we must ultimately and continuously evaluate how they perform in that environment.

They tend to favor dry conditions, so, if we are not careful, their hooves can become infected. They can suffer with hoof rot and, therefore, it becomes necessary to trim their feet periodically. And, sometimes, we may need to treat with this hoof rot chemical here to help them overcome foot problems. An examination, of course, involves looking at them, palpating various regions, various parts of his body, examining him and then determining whether there are conditions that we can treat, or, alternatively, would we need to remove him from the breeding group. I said we look at general health, Famacha, and body condition score. So in terms of Famacha scoring, Famacha scoring, pretty much like body condition scoring, is done on a scale of one to five. What we're trying to do is determine the amount of blood—the extent to which parasites have infected the buck. The greater amount of parasites, the worse would be the Famacha score.

Dr. Sarah Carr (Dr. Carr): What do you got there?

Student 1: I would say “two” [for Famacha score].

Dr. Carr: You would say “two”?

Dr. Baptiste: You got a score there for body condition?

Student 2: He looks great.

Chapter Two: Student Involvement in the Field

Anthony Nolen: We are taking up electric fencing to keep goats in an area of the forest so they can eat the invasives out of that area so that the native plants can thrive.

John: The left front is the same deal, pretty good you cut that side flare off. You're alright, Martin, stay still, we're teaching. You're an educator.

Chapter Three: Goats in the Forest

John: Today is September 14th and we just put the netting in on the project area so we're going to show you the perimeter. So, this is an old road bed, just to the right of us is the lake, Owsley Reservoir, and this is an area that used to be an old road, has been left to its own devices and is now full of invasives. There's autumn olive, little bit of privet, honeysuckle, and multiflora rose.

Here's an example of autumn olive in berry right now. Very prolific throughout this area. Here's another invasive, this is called wintercreeper. Waxy leaf. Very, very invasive throughout the region here in Kentucky and very difficult to get rid of so we're excited to see what the goats are going to do to that while they're in here.

We have Premier One fencing set up, five rolls worth of netting along the perimeter inside of the unit. As you can see, very heavy foliage. Lots of vegetation which will be good for the goats and would make it extremely difficult for clearing out and selecting the invasives to treat. So we'll put the goats in here, let them clear out the understory, make it more accessible to some of the invasives that are buried deep in this thick greenery. And after we get done clearing this side, prepping to plant a small fruit forest, we'll move the netting over here to clear out the back of the piece of property.

It's day two out here on our plot, we're checking on all the animals. It's been raining, so everybody's all wet and look like they've been drug through the mud.

This area is more of a riparian zone than we originally anticipated. Here we can see, we have water running through the site right through the middle amongst the greenery, but the goats are still hard at work out here, grazing away. With this new information about how wet the site actually gets, the management plan is probably going to shift a little. There's a possibility that we'll go from planting a permaculture food forest to planting a riparian area tree instead, maybe sycamores. Might plant a big grove of sycamores to help the integrity of this low riparian zone.

Chapter Four: After the Goats

Zen Dean (Zen): So right here we're on the fence line, our goats were on this side. This is what it looked like before, as you can see, you can't get up in here and cut this. But over here we have a multiflora rose bush, invasive bush, and here you can get right in here and grab the saw and cut this. It's much easier than if we were over here, you'd get torn to shreds. This is part two of what we've been doing out here with the goats, trying to treat invasives. First we came out and set up a perimeter of fence line, half an acre or so. Set up the temporary fence, the mesh, around the highest density area of invasives we could find. Goats are really becoming popular to treat invasives because it's greener than just spraying the forest with herbicides and it benefits the animals and benefits the land. Here we have an area of autumn olive, that we can see is cleared pretty nicely below the brush and we can come in and cut the autumn olive then stump treat each individual autumn olive.

John: What's the alternative to stump treating?

Zen: Spraying. Spraying the whole entire woods, which would run right off into the creek right beside us and that's what you don't want.

As you can see we have an autumn olive here. The first thing you notice is that we're actually in here beside the tree. Before, the vegetation was so dense, it was too hard to work, you couldn't get in here and cut this tree. But the goats came in here and they cleared all this brush, made it really easy to work.

John: Today is November 30th, 2021 and we're wrapping up the last stage of the goat portion of our project. I have some students here that are going to explain what we've done throughout the course of this portion of the project and then what's coming next.

Zen: I'm Zen Dean, a junior Agriculture major at Berea College. After the goats came here in our project area, we came through and cut out all the invasives we could find—multiflora rose, autumn olive, privet, and a lot of wintercreeper that we got, actually, the goats got a lot of that. After that, we stump treated. To limit the amount of herbicide we used we stump treated each individual stump. Yeah, that's pretty much what we've done so far.

John: So you're happy with what's taken place so far?

Zen: Absolutely, the goats did a really good job and it made it really easy for us to get in there and clear everything out by hand.

Abbie Phelps: My name's Abbie Phelps, I'm a senior Agriculture major at Berea College. After we did what Zen just talked about, we came in and removed all the dead, diseased, and dying trees. Then we took a bush hog that you see behind me and cut all the underbrush out to open everything up and get what we couldn't get by hand, in preparation for our next part which is tree planting.

Chase Lawson: My name's Chase Lawson, I'm a sophomore Forestry major at the University of Kentucky. The next step in this process is to plant native species like white oak, persimmon, and sycamore in this creek area right here because they're native trees and they grow well in this area.

John: We're just going to do a quick walk around and look at where we worked and what we worked in and we'll see the difference from where we started. Where we're walking now is the same perimeter that we had the fence up for the goats. You can see that we cleared out the underbrush. You see this blue dye sticking off some of these stumps where we treated the invasive species and a nice clear understory buffering up to the creek that we're going to come in and plant sometime in January.

Part Three: Tree Planting

John Henry Hite III (John): Today is January 25th of 2022 and we are finishing up the last leg of our project. We're about to plant trees on the site. We have persimmon, white oak, sycamore, and black locust to plant here.

Clint Patterson (Clint): White oaks are a key species for the wildlife. Their acorns are an important mast source of food for everything from deer, turkey, to other wildlife. They're also very important for the economy of Kentucky and surrounding states. White oak is one of the most valuable species for veneer and staves for the manufacturing of wooden barrels which are in high demand now due to the booming bourbon market. White oak is a species of concern. There's a white oak initiative in Kentucky to really focus efforts on making sure that we don't run out of high-quality white oak in our forests. So, it's important to manage your forest to sustain white oak that's already there and if you're planting trees on an area to reforest it and the soils can support white oak, it's a good species to plant. We're trying to go full-circle here and manage our existing white oak stands while also trying to encourage the growth of more white oak.

Chapter One: Sapling Preparation

Clint: These seedlings, a lot of them have way too much root. With the dibble bars, planting bars, that we're using, you try to stick this in the hole, the roots are going to be pointed up and crammed in there—can cause what's called “J” rooting. If a root's curved up, pointed up out of the hole and it'll quickly dry out. The tree will likely die. So even though it's counterintuitive that we're cutting off a lot of these roots, it's what you have to do so they can fit properly in the hole, and if you cut a lot off like these really big ones, then you're going to have to cut some of the top of the tree off, as well. You're better off to have a tree of reduced size that's going to live than a big tree that's going to die. That's about the maximum, you'd have to put two dibble holes for this one.

John: These are the students, say your names!

Joe Slade: Joe.

Chase Lawson: Chase.

Zen Dean: Zen.

Andrea Ola Mejicanos: Andrea.

Chapter Two: Planting the Saplings

Glen Dandeneau: The dibble bar is inserted into the soil and a lot of times, you have a nice, healthy root system, you've got a lot of root. So, sometimes if I have a very big root system I may go twice in here and try to spread it nicely, make sure that I got that bottom open so that those roots go down as much as possible into that lower section. Usually I just bunch the roots together and I'm trying to make sure that all the roots go down and don't “J”, because that's what you don't want, you don't want a “J” root. So, I get it down in there. I'm also looking for the same soil level that the tree came out of so, here it's not readily apparent, but I'm gonna give it my best guess that that's about the right place and I usually try to get them where they're fairly

vertical. Then you come behind where you put the divet in and just put the bar back in, press it forward, and typically I put a little bit of pressure on both sides. I'm trying to get it to grow as straight as possible, you just want the soil to close around the roots so that you don't leave any roots exposed to the air, because the worst thing you can do is leave the roots exposed and the roots dry. Once they dry out, there's a chance they'll die.

If you see your roots drying out a little bit just take them and dunk them in the water because that's the most important thing, just keeping those roots moist.

Chapter Three: Future Management

Clint: We're standing here in part of the Berea College Forest that's just a couple hundred yards from where we planted the seedlings. This is a nice, about 18" white oak tree here, *Quercus alba*. We planted some white oak in the other area and this shows what those trees are capable of growing into. This is just beginning to be mature, we have trees that are two, three times this size on the College forest. So, now we've completed the planting, but that's not the end of management for this piece of property. When you're in forestry, you have to think long-term and after you put the trees in the ground, they still have to be maintained to keep them from being overwhelmed by competition, invasive species in particular, and then vines, volunteer sprouts from tulip poplar, sycamore, different trees that may jump in there. In between the rows will have to be managed, kept cleaned out away from the trees we planted. Over time we'll monitor this area as the trees get bigger, we'll make sure they're free of competition so they'll grow well. Eventually, the trees may need to be thinned and we thought of that ahead of time by planting every other row to species that we consider nurse trees. The black locust and persimmon are smaller growing trees, they don't get really big like the white oak and the sycamore, so they won't be able to compete with the sycamore and white oak, they'll stay in a non-competitive position. So, eventually, some of those may need to be taken out, we can probably remove the black locust and use them for fence posts and fire wood when they get to about the size that they're useful. They'll have served their purpose as nurse trees to help the other ones grow straighter and taller. One benefit of the black locust also is that they're a legume species. The nitrogen that the black locust puts into the soil helps it to be more fertile so the other tree species benefit. Some of these old fields, this is an old abandoned field site, sometimes those old fields are pretty poor as far as nutrients, so that will help boost the fertility of the soil. The leaf litter is also good for the site and as the leaf layer develops you get a good humus layer. Eventually, as the trees get quite a lot larger, say in 20, 30 years, you can thin out the stand so we may even remove some of the white oaks in time. A forest manager is always looking for what to do next and you're never lacking something to do managing a forest but it's something that we enjoy and it's a way to be, to some degree self-sufficient, and get material to use from your own forest.

John: Thank you guys for coming along with us.