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# Working Trees: Silvopasture, An Agroforestry Practice

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# Working Trees

# Silvopasture

An agroforestry practice

Combining *Working Trees* with forage and livestock produces marketable products and maintains long-term productivity.



**“** We chose a silvopasture system so we could maximize our return from the land—from the cattle as well as the timber—over the next 20 to 25 years.”  
—George Owens, Chipley, FL

Silvopasture integrates trees, livestock, and forage into a single system on one site.

These components diversify income sources. Annual income from grazing and long-term profits from trees respond to different market pressures and reduce risk when combined in the same operation.

Shade from the trees lengthens the forage growing season and improves forage quality. It also

increases the comfort level for livestock which reduces stress.

The structure and plant diversity of silvopastures is attractive to many wildlife species including wild turkey, quail, deer, and many songbirds.

Silvopastures are inherently sustainable systems. They increase biological diversity, protect water quality, reduce soil erosion, and improve the water holding capacity of the soil.

Other benefits include natural insect control, opportunities for recreational activities like hunting and birdwatching, and enhanced aesthetics and property values.

Silvopasture is becoming an important land-management strategy on many farms and ranches in the southeastern United States. It is becoming more important on farms and ranches where coniferous trees exist in other parts of the country as well.

# Components of silvopasture

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“ Management of trees, cattle, and forage is more complex than management for single products, but can yield profitable returns for many years.”

—Nathan Byrd & Cliff Lewis, USFS Southern Forest Experiment Station

## Trees

Locally marketable tree species can provide significant long-term income. Trees must be fast growing, deep rooted, drought tolerant, and respond well to pruning. Trees also provide wildlife habitat and store carbon.

## Livestock

Currently, silvopasture systems primarily involve cattle, goats, or sheep. Other potential livestock choices include: horses, turkeys, chickens, ostriches, emu, or game animals such as bison, deer, elk, and caribou.

## Forage & browse

A variety of plant types, including shrubs, grass, legumes, and forbs can make up the forage and browse component. Choices depend on the livestock component and must be tolerant of grazing and productive under shade.

## Soil

Adequate soil fertility, proper pH, and well-developed structure provide the foundation for a productive silvopasture system. Other building blocks include proper drainage and erosion control.

# Planning considerations

Silvopasture systems are intensively managed and therefore require regular and consistent attention. A producer must understand each of the three components, trees, forage, and livestock, and how they interact in order to be successful. After inventorying the existing resources, consider the following:

## Livestock

Select livestock for which there is a local market. This may include common cow-calf or dairy operations, but may include niche market animals for rodeos, meat goats, or sheep milk. Forage requirements will vary depending on the variety of livestock.

## Short rotation grazing

This method of grazing, though more productive, also requires more labor and regular monitoring along with more fencing and watering facilities which may take some time to develop. For maximum production, improved forage species should be established.

## Wildlife

Although silvopastures can provide quality habitat for some species of wildlife, not all wildlife will benefit.

Adjustments in vegetation can be made to enhance target wildlife species, but reductions in forage quality or wood value may result.

## Assistance

Technical assistance may be necessary to develop a system that will function effectively. State and federal programs may be available for financial assistance with tree planting or thinning, or pasture establishment.

## Forage

must be suitable for livestock grazing, compatible with the site, productive under partial shade and moisture stress, responsive to intensive management, and tolerant of heavy utilization.

## Trees

Although fertilization and pruning increase labor and input costs, the overall economic return is greater because the goal is to produce high quality lumber or poles, not pulp or chips.



## Transition strategy

Converting a pasture or pine plantation into a fully functioning silvopasture doesn't happen overnight. The significant investment in fencing, water distribution, tree establishment or removal, forage establishment, and possible temporary pastures requires a well thought out transition.

## Region

Silvopasture systems have been successfully implemented in the western and southern parts of the United States with coniferous trees. Research, however, is still inconclusive if silvopastures will work in other parts of the country.



# Design & establishment



## Pasture to silvopasture

Forage suppression using herbicide, tillage, or mulch may be required for 2 to 3 years to establish tree seedlings.

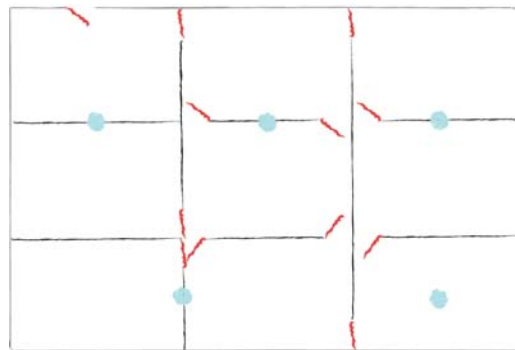
or



## Plantation to silvopasture

Trees need to be thinned to the proper density. Use normal establishment procedures to establish forage.

“Each opportunity must be examined on its own merits to determine if the operation is likely to prove profitable. The unique requirements for such multiple-use operations is expertise in both timber and cattle management.”  
—Nathan Byrd & Cliff Lewis, USFS Southern Forest Experiment Station



## Paddock arrangement

Because overgrazing reduces the forage nutritional composition and its ability to regenerate, fencing (—) is an important component of a silvopasture system. Fence plans should be flexible and not limit grazing options. The location of gates (—) needs to facilitate the movement of livestock through the paddocks and the alignment of temporary lanes and alley ways. Animal performance also improves with frequent access to water (●).



## Tree pattern

Silvopasture trees can be arranged in uniform block plantings, clusters, or in single or multiple rows. Evenly distributed trees in block plantings optimize the growing space and light for both trees and forages. Trees grouped in rows or clusters concentrate shade and root effects and provide open spaces for pasture production. The spacing between trees or tree rows should be wide enough to accommodate equipment for haying or fertilizing.

# Management

Silvopasture management, as with all agroforestry practices, ideally reflects the “Four I’s”: trees and shrubs are *intentionally* combined with crops or livestock to create an *integrated* system that relies upon the *interactions* of the trees and crops, and is managed *intensively* to achieve economic, environmental, and social benefits.



## Woody & herbaceous plants

Overgrazing can reduce the proportion of desirable plants. The understory and overstory affect each other and must be managed as one unit, together with the livestock. Plant legumes for nitrogen fixation and forage production.

## Tree canopy & thinning

The canopy is managed between 25 to 45 percent cover for warm season grasses and 40 to 60 percent for cool season grasses. This will require thinning at intervals of every 5 to 7 years depending on site productivity.

## Livestock

Livestock need to be inspected for parasites that may cause them to rub on trees. Young trees must be protected from livestock. Either the pasture needs to be hayed or the trees need to be protected by electric fences, tree shelters, or rigid mesh tubes until they have grown above chewing height.

## Controlled grazing

Grazing time should be according to forage growth, not a fixed time schedule. Animals must be moved to a new paddock before they graze new regrowth of the current paddock. Strategically locate salt and mineral licks, and walkways to encourage uniform livestock distribution.

## Soil testing

Regular testing will help indicate when additional fertilizer or lime is needed to support forage production.

## Pruning

To produce high quality, knot-free wood on the outer diameter of the tree stem, pruning begins when trees reach 15 to 20 feet tall and have a diameter of five inches at a height of six inches above the ground. Continue pruning until the tree reaches the desired height of 18 to 32 feet.

## High concentration areas (water trough, salt)

Monitor these areas for soil compaction and invasive weeds.

“From my experience, intensive management is the key to this system. If a silvopasture is not managed, it won't function properly.” —Lyn Ellison, Tupelo, MS



# Why consider silvopasture?

## Forage

With a well managed grazing practice, a producer can economically handle weeds and brush without herbicides, maintain fire breaks, and minimize habitat for gnawing rodents. Grazing animals control competition for moisture, nutrients, and sunlight, thereby enhancing tree growth. Livestock manure recycles nutrients.

## Livestock

Silvopastures provide shade and wind protection which can increase livestock performance. Trees can cut the direct cold effect by 50 percent or more and reduce wind velocity by as much as 70 percent. Well-managed forage production provides improved nutrition for livestock growth and production.



**“Current market trends (i.e. low domestic pulpwood prices) are forcing the forestry community to look at other options. A silvopasture system can produce short-term or annual economic returns while being able to produce a high value timber product over the long term.” —Rick Hatten, Georgia Forestry Commission**

## Environment & aesthetics

Silvopastures create biological diversity and improve water and soil quality. Plant diversity creates wildlife habitat. Perennial forage protects the soil from water and wind erosion and adds organic matter to the soil. Silvopastures create an attractive landscape.

## Stewardship

Being a good land steward helps alleviate environmental concerns related to water quality, odor, dust, noise, disease, and animal treatment. Silvopasture gives landowners something to pass on to the next generation.

## Economics

Silvopasture systems reduce economic risk by producing multiple products. The production costs are reduced and marketing flexibility is enhanced by distributing management costs between the tree, forage, and livestock components.

## Woodland

Silvopastures provide opportunities to harvest a variety of products: sawtimber, veneer logs, posts and poles, pulpwood, firewood, organic mulches, harvested game, nuts, fruit, ornamental flowers and greenery, mushrooms, and other secondary products.

## For more information

For local assistance, contact your nearest USDA NRCS Office, County Extension Office, Soil & Water Conservation District, State Forestry Agency, or a local natural resource consultant.

For more information at the national level, contact the USDA National Agroforestry Center (NAC), 1945 N. 38<sup>th</sup> St., Lincoln, NE 68583-0822. Telephone 402-437-5178.



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Contact: USDA National Agroforestry Center (NAC), 1945 N. 38<sup>th</sup> St., Lincoln, NE 68583-0822. Phone: 402-437-5178; Fax: 402-437-5712; Website: [www.unl.edu/nac](http://www.unl.edu/nac).

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