

Silvopasture



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TABLE 1: Reasons for, and challenges of, silvopasture utilization by 20 farmers practicing silvopasture in New York and New England. Farmers practicing silvopasture were purposefully identified and interviewed. Farmer may have provided more than one reason for or challenge of silvopasture utilization.

<i>Reasons for silvopasture utilization</i>	<i>Number of Farmers</i>
Shade for livestock	16
Expanding pasture acreage and diversity	14
Increased utilization of existing farm woodland	12
Increased forage availability during mid-summer and droughts	12
Diversified livestock diet	8
Overall animal welfare	6
Management of undesired vegetation	5
Winter shelter for livestock	4
Tree health/fertilization	3
Increased farm aesthetics	2
<i>Challenges of silvopasture utilization</i>	---
Fencing establishment and maintenance	9
Lack of knowledge toward silvopasture management	6
Lack of time for silvopasture management	5
Unknown forage quality and management techniques	5
Reduced mobility of machinery	3
Support from agricultural extension organizations	3
Undesirable vegetation	2
Fleece contamination in fiber animals	1
Epicormic branching on trees	1
Monitoring livestock	1

Orefice, J., Carroll, J., Conroy, D., and L. Ketner. (2017). Silvopasture practices and perspectives in the northeastern united states. *Agroforestry Systems* 91: 146-160

Forage establishment, timing is important



What are you starting with?







UGA5019031

**Pennsylvania Department of Conservation
and Natural Resources - Forestry Archives,
Pennsylvania Department of Conservation and
Natural Resources, www.forestryimages.org**



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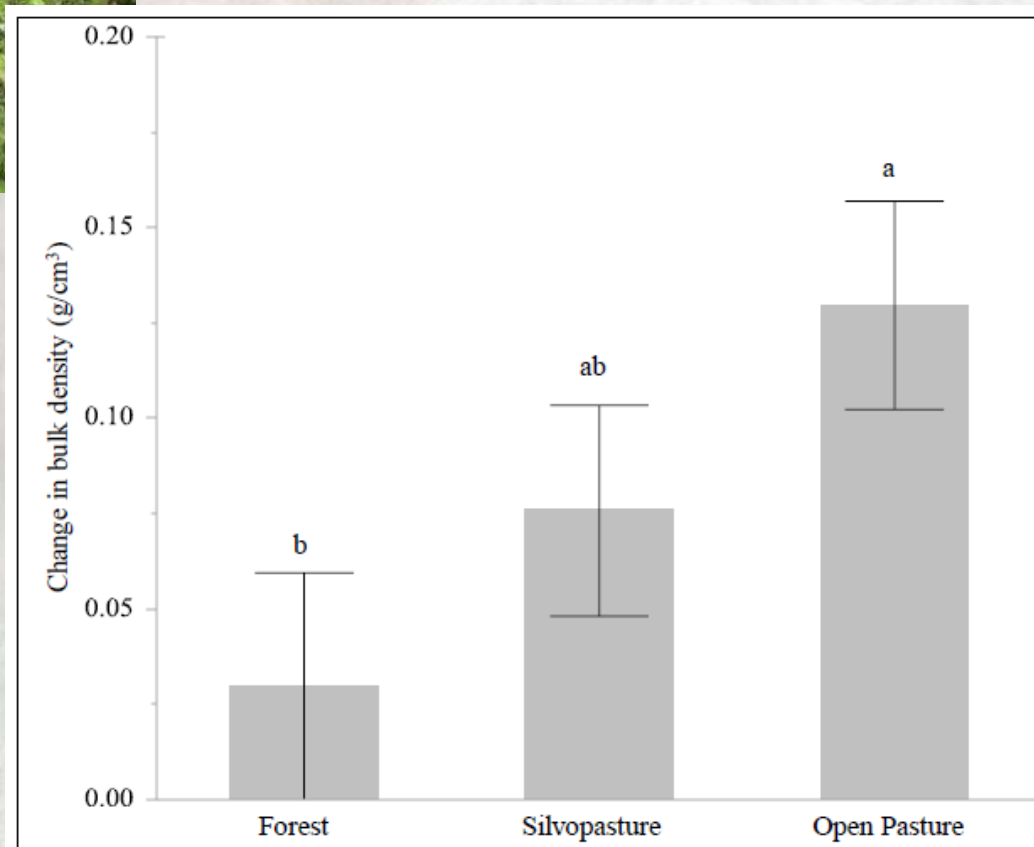


Forest Conversion – Manage Competition!



Prior to forest conversion, ask:

What and how much can my current livestock control?



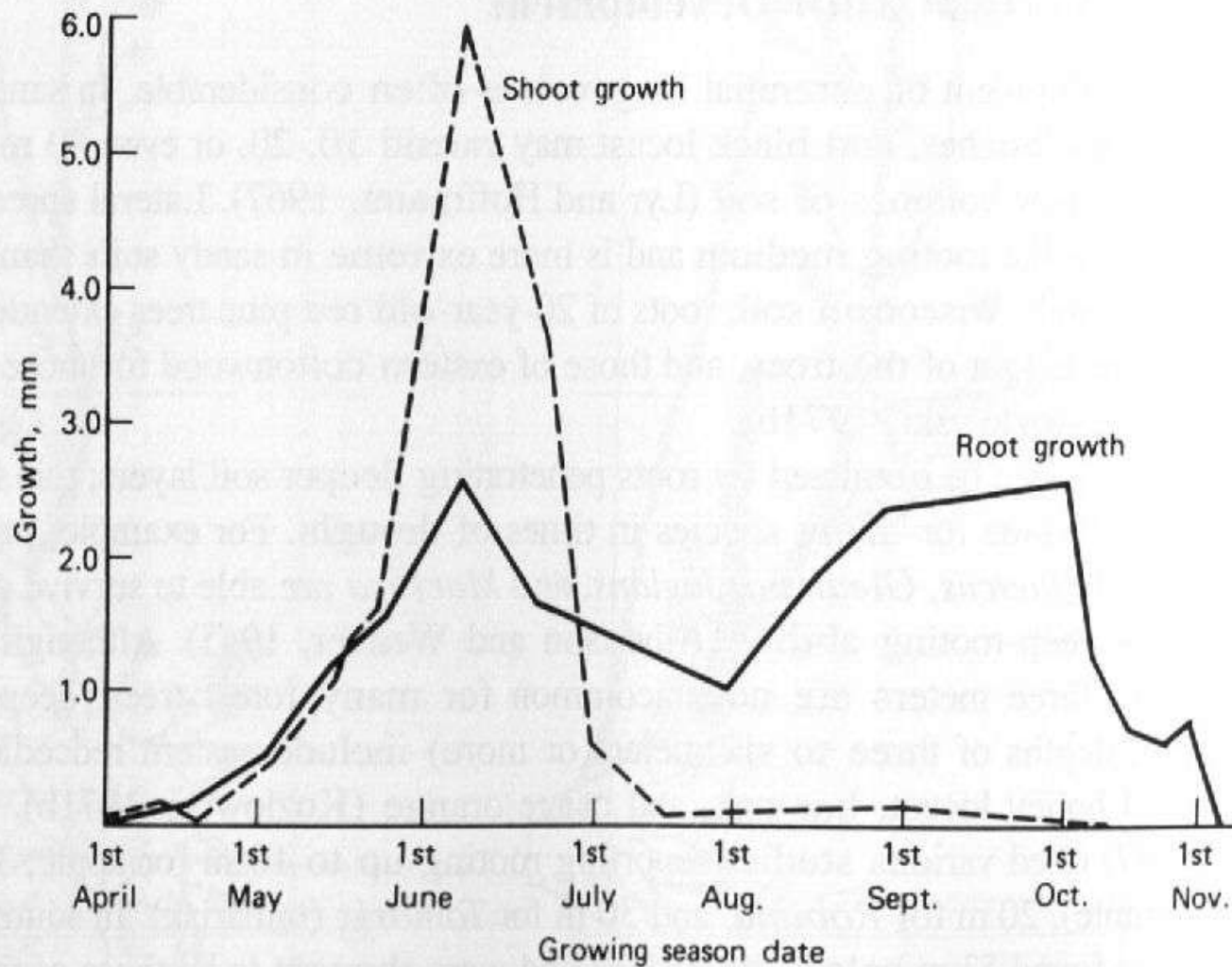


Figure 6.8. Comparison of average daily extension for shoots and growing roots. Root and shoot growth follow distinct but different seasonal patterns. The growth rate of roots declines in mid-summer and ceases in winter. (Modified from Stevens, 1931.)

... animals can damage trees and
GRASS



Site preparation or Soil Degradation?



Slash



Forage Selection and Seasonality



Table 2. Total above ground dry weight of 27 forages under three levels of shade during the 1994 and 1995 summer-fall growing season at New Franklin, Missouri (92°46' W; 39°01' N).

Species	Full sun (g)	50% shade (g)	80% shade (g)
Introduced cool-season grasses			
Kentucky bluegrass	12.45a	12.30a	8.06b
Orchardgrass 'Benchmark'	13.83a	11.73a	6.36b
Orchardgrass 'Justus'	11.71a	11.16a	9.53a
Ryegrass 'Manhattan II'	12.69a	11.10ab	8.59b
Smooth brome	9.61b	11.95a	9.54b
Tall Fescue 'KY31'	13.28a	16.24a	7.96b
Tall Fescue 'Martin'	12.36a	11.79a	6.09b
Timothy	10.23a	8.97a	5.49b
Introduced warm-season grasses			
Bermudagrass	56.05a	37.04b	8.59c
Native warm-season grasses			
Big bluestem	45.27a	33.41b	17.76c
Buffalograss	29.86a	13.67b	6.12b
Indiangrass	42.34a	30.72b	16.86c
Switchgrass	79.46a	57.59b	26.47c
Introduced cool-season legumes			
Alfalfa 'Cody'	6.21a	5.31ab	3.76b
Alfalfa 'Vernal'	9.44a	7.13b	4.23c
Alsike clover	17.02a	9.78b	5.43c
Berseem clover	15.99a	6.95b	2.88c
Birdfoot trefoil hybrid Rhizomatous	15.01a	9.83b	5.28c
Birdfoot Trefoil 'Nocern'	19.61a	12.65b	5.96c
White clover	15.98a	13.02a	9.45b
Red clover	19.88a	12.08b	

On-farm Research: Investigate the system productivity, environmental effects, and economics of forest conversion into silvopasture, open pasture, and managed woodlot.



Northern Hardwood Forest Conversion to Silvopasture, Open Pasture, and Woodlot

Will It Pay?

- **Net Present Value(NPV)** is a **calculation** used to determine the **present value** of an investment by the **discounted sum** of all cash flows received from the project.

NPV = initial investment + sum of discounted future cash flows (positive and negative)

www.financeformulas.net

Example: black locust silvopasture (25 years @ 5% i)

<u>\$/Acre</u>	<u>Year</u>	<u>Activity</u>
• \$1000	0	Establishment cost (~ 1000 trees/ac)
• -\$100	1	maintenance, replant
• -\$50	2	maintenance
• \$625	15	thinning for posts (net revenue)
• \$1250	20	thinning for posts (net)
• \$5000	25	final harvest for posts (net)

$$\text{NPV} = - 1000 + - 95 + - 45 + 301 + 471 + 1477 = \$1108$$

No replanting cost (coppice and suckering)



Table 5: Forage cost/revenues per hectare in 2012 NPV for six forage treatments in open pastures and silvopastures converted from forests in 2012, assuming a discount rate of 3%.

<i>Forage Treatment</i>	<i>Seed cost 2012</i>	<i>Seeding labor 2012</i>	<i>Total forage production 2013</i>	<i>Total forage production 2014</i>	<i>Total NPV</i>
Bluegrass/Clover	\$165.56	\$12.36	\$43.85	\$71.51	-\$62.56
Brome/Clover	\$205.10	\$12.36	\$62.97	\$88.60	-\$65.89
Hay	\$98.84	\$0.00	\$41.34	\$93.96	\$36.46
None	\$0.00	\$0.00	\$3.86	\$50.63	\$54.49
Orchardgrass/Clover	\$154.69	\$12.36	\$122.28	\$117.66	\$72.90
Ryegrass/Clover	\$133.93	\$12.36	\$67.17	\$73.69	-\$5.42

- indicates negative values

Table 7: Internal rate of return (IRR) and net present value (NPV) per hectare at multiple discount rates, with and without initial timber harvesting costs, for four land management options. Silvopasture consistently yielded the highest NPV of all options due to annual and long-term sources of revenue. ‘No management’ was financially competitive with silvopasture when initial timber harvesting costs were incurred.

<i>Including establishment harvest cost</i>				
Treatment	IRR	NPV/hectare		
		3%	4%	5%
Open Pasture	2.6%	-\$77	-\$231	-\$356
Silvopasture	6.4%	\$1,277	\$773	\$391
Woodlot	1.2%	-\$662	-\$883	-\$1,033
No Management	6.9%	\$1,003	\$607	\$327
<i>Not including establishment harvest cost</i>				
Treatment	IRR	NPV/hectare		
		3%	4%	5%
Open Pasture	18.2%	\$951	\$787	\$653
Silvopasture	19.2%	\$2,306	\$1,987	\$1,552
Woodlot	4.8%	\$366	\$135	-\$24
No Management	6.9%	\$1,003	\$607	\$327

- indicate negative values



October 2012



August 2013



June 2014



June 2017



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Orefice, J. and J. Carroll. (2016). Silvopasture, it's not a load of manure: differentiating between silvopasture and wooded livestock paddocks in the northeastern United States. *Journal of Forestry*. In Press.