Grazing Silvopasture

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Outline

- Woodland pasture
- Silvopasture systems in the Northeastern US
- Grazing and Livestock Components
- Forest Conversion to Silvopasture

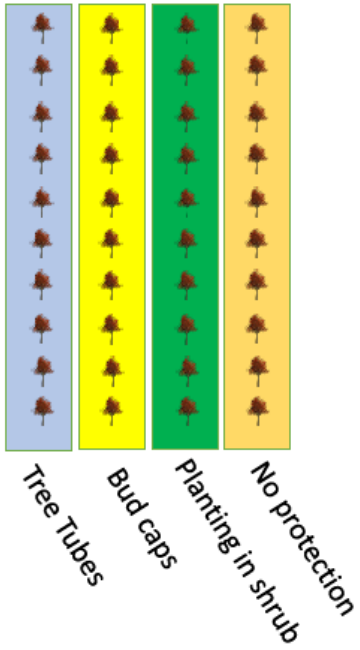
Hidden Blossom Farm

Current On-Farm Research

Figure 1: Basic study design for "Tree regeneration and establishment strategies in silvopasture and sugarbush systems" (Not to scale)

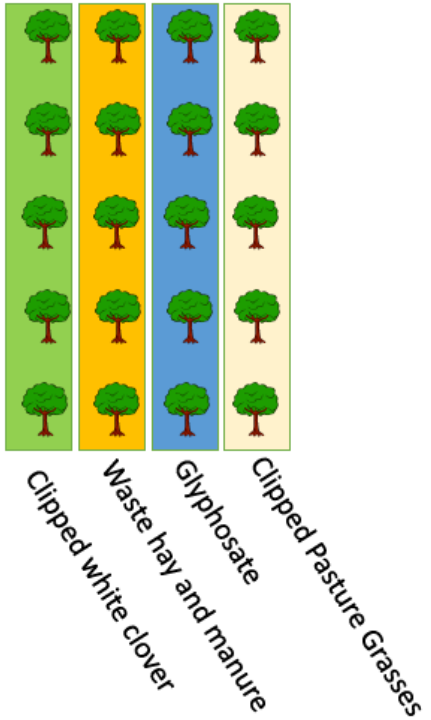
Part 1: Apical bud protection

Illustrating 1 of 6 randomized complete blocks



Part 2: Mulching systems

Illustrating 1 of 5 randomized complete blocks



Silvopasture:

The sustainable production of livestock, trees, and forage on the same unit of land

Silvopasture is NOT

Unmanaged pastured woodlands

Livestock eating brush

Wolf trees in open fields

Woodland Pasture (Managed?)

Table 1. Distribution of woodland pasture in New York and New England.

State	Land in pasture	Woodland pasture	No. of farms using woodland pasture*	% of total pasture acreage that is woodland pasture
	.....(ac).....			
Connecticut	72,018	21,081	1,056 (24)	29
Massachusetts	85,760	17,837	1,093 (59)	21
Maine	118,980	27,105	1,103 (58)	23
New Hampshire	46,446	12,447	706 (54)	27
New York	985,494	146,995	5,286 (186)	15
Rhode Island	10,098	2,281	198 (7)	23
Vermont	195,000	37,100	1,184 (68)	19
Region	1,513,796	264,846	10,626 (456)	17

Of total pastureland in the region, 1 in 6 acres (17%) is woodland pasture. In the New England states, the proportion of woodland pasture to total pasture area is more than 1 in 5 (22%). These data are from the Census of Agriculture, but the management of these pastures was not addressed (Vilsack and Clark 2014).

* Number of farms self-identifying as practicing alley cropping or silvopasture.

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*: 2017.

Undisclosed northeast US farm

Unmanaged Pastured Woodlands

1: Root Compaction

2. Girdling from Livestock

3. Soil Degradation

4. Parasite problems

Silvopasture, It's Not a Load of Manure: Differentiating between Silvopasture and Wooded Livestock Paddocks in the Northeastern United States
Authors: Orefice, Joseph and Carroll, John
Source: Journal of Forestry

A Regional Investigation into Silvopasture

- Purposeful sampling of 20 farms practicing silvopasture in New York and New England
  - Interviews with practitioners
  - Inventories of silvopasture systems

Research Supporters

Northeastern States Research Cooperative

TABLE 2: Type of silvopasture systems found on 20 farms in New York in New England purposefully identified. In some cases, multiple types of silvopasture existed on the same farm. Silvopasture systems were described through interviews and on-site inventories.

Silvopasture type	*Number of Farms*
Forest conversion to uniform tree spacing	13
Open field edges	7
Orchards	6
Forest conversion to patch tree spacing	5
Outdoor living barns	4
Forest conversion to irregular tree spacing	3
Hardwood plantations	2
Conifer plantations	1
Maple sugarbush	1

TABLE 5: Tree composition and uses of silvopastures on 20 farms in New York and New England. Tree composition was acquired through silvopasture inventories on 15 farms and phone interviews with 5 other farms. Goals for trees in silvopastures were acquired by interviewing silvopasture practitioners at the 20 farms.

Dominant tree species/groups (Common Name)	*Number of Farms*
Quercus spp. (oaks)	11
Acer spp. (maples)	10
Fruit trees, primarily *Malus* spp. (apples)	8
Pinus strobus (eastern white pine)	4
Carya spp. (hickories)	4
Tsuga Canadensis (eastern hemlock)	3
Commercial nut trees, primarily *Juglans* spp. (walnuts)	2
Robinia pseudoacacia (black locust)	2
Goals for trees in silvopastures	---
Sawtimber	12
Firewood	12
Fruit or nuts	11
Maple sugar potential	4
Wildlife habitat	3
Fence posts	2
Scion wood	1

TABLE 3: Forage and non-woody understory plants occurring in more than 5 silvopasture inventories on 20 farms in New York and New England. Understory plants were sampled using percent cover in fixed area plots within silvopastures.

Common forages	*Common non-woody plants*	*Forages actively managed for*
red clover (*Trifolium pratense*)	sedges (*Carex*spp.)	red clover (*Trifolium pratense*)
white clover (*Trifolium repens*)	ferns	white clover (*Trifolium repens*)
orchardgrass (*Dactylis glomerata*)	brambles (*Rhubus* spp.)	timothy (*Phleum pratense*)
bentgrasses (*Agrostis* spp.)	wood-sorrel (*Oxalis acetosella*)	orchardgrass (*Dactylis glomerata)*
bluegrasses (*Poa* spp.)	dandelion (*Taraxacum officinale*)	ryegrasses (*Lolium* spp.)
fescues (*Festuca* spp.)		diversified woody browse
timothy (*Phleum pratense*)		

TABLE 4: Undesirable plants stated by more than one silvopasture practitioner in New York and New England. Interviews were conducted on with 20 purposefully sampled silvopasture practitioners.

Plant Species	Common Name
Rosa multiflora	multiflora rose
Berberis thunbergii	Japanese barberry
Fallopia japonica	Japanese knotweed
Celastrus orbiculatus	oriental bittersweet
Rhammus spp.	buckthorn
Lonicera spp.	honeysuckle
Ligustrum spp.	privet
Cirsium spp.	thistle
Carex spp.	sedges
Kalmia latifolia	mountain laurel
spp.	ferns

Forest Conversion- Uniform Tree Spacing

Same farm, different stand

Alpine Pasture, Bavaria (overgrazed)

Forest Conversion- Grouped Tree Spacing

Forest Conversion- Variable Tree Spacing

Year < 5

Open-pasture Edge

Year 10-15

Open-pasture Edge

Plantation (black walnut)

Plantation (black locust + walnut)

Year 20ish

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

$/Acre	Year	Activity
• $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)

NPV = - 1000 + - 95 + - 45 + 301 + 471 + 1477 = $1108

No replanting cost (coppice and suckering)

Orchards

Wild apples to cider orchard


North Branch Farm, Saranac, NY

Pecan orchard silvopasture in the Southern US

Figure 4. Example of silvopasture-grazing cattle in a pecan grove at Crenshaw Farm near Como, Mississippi.
http://extension.msstate.edu/publications/publications/alternative-markets-for-generating-forest-income

Grazed orchards in Italy

Streuobst systems in Europe

https://www.streuobst-mainfranken.de/cms/index.php/pflege/unterwuchspflege

From Viola Taubmann’s family farm in Bavaria

Stakes to protect from hay equipment

Overgrazed during wet conditions

Overgrazed during wet conditions

Outdoor Living Barns

Fencing Systems

Livestock and the thing about pigs . . .

Pigs . . .

Rooting is NOT the same as traditional systems

European Silvopasture Systems are more than just pigs under oaks

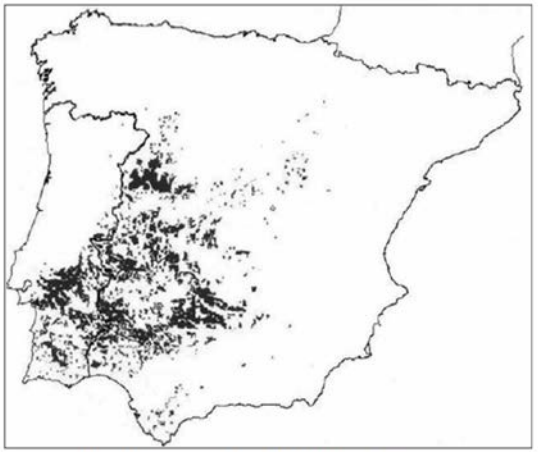


Fig. 1. Geographical distribution of the dehesa in the Iberian Peninsula.

Consumption of Acorns by Finishing Iberian Pigs and Their Function in the Conservation of the Dehesa Agroecosystem

Vicente Rodríguez-Estévez*, Manuel Sánchez-Rodríguez, Cristina Arce, Antón R. García, José M. Perea and A. Gustavo Gómez-Castro
Departamento de Producción Animal, Facultad de Veterinaria, University of Córdoba, Spain

Dehesa - Spain

https://www.saboraextremadura.es/dehesa-de-extremadura/

Montado - Portugal

Back to the US…


Feedlots with Trees

Shade alternatives?

Why graze?

Similarly, rotationally grazed herds with fewer than 60 cows had lower standard plate counts than confined herd of similar size. Mean bulk tank counts of streptococci other than Streptococcus agalactiae during the grazing season differed among treatments. The lowest counts occurred in rotationally grazed herds. Among herd using predip products recognized as efficacious, fewer streptococci other than S. agalactiae were isolated from bulk tank milk of rotationally grazed herds than confined herds.

The Influence of Intensively Managed Rotational Grazing, Traditional Continuous Grazing, and Confinement Housing on Bulk Tank Milk Quality and Udder Health -J.J. Goldberg et al

Rotational grazing concepts

Continuous vs Rotational Grazing

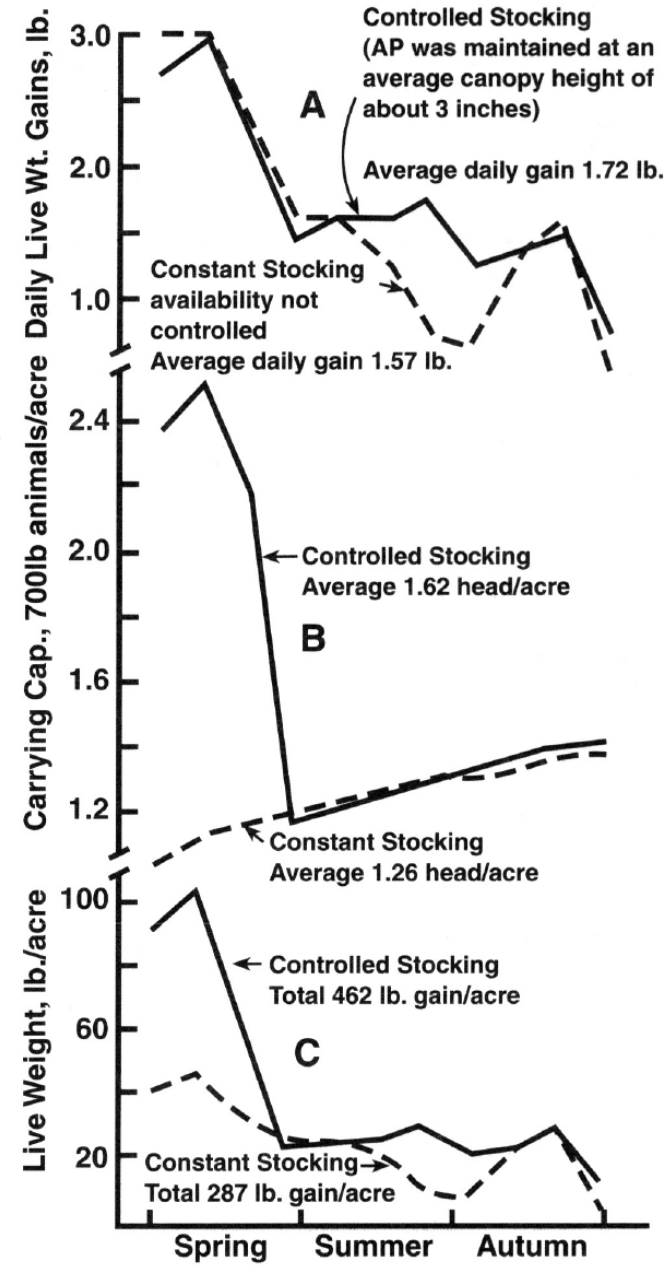


Figure 1. *Controlled stocking based on available pasture gave higher liveweight gains per animal and per acre than constant stocking.*

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The result of continued, continuous grazing:

Percent leaf volume removed	Percent root growth stopped
10%	0%
20%	0%
30%	0%
40%	0%
50%	2-4%
60%	50%
70%	78%
80%	100%
90%	100%

Adapted fromNRCS, Bozeman, MT

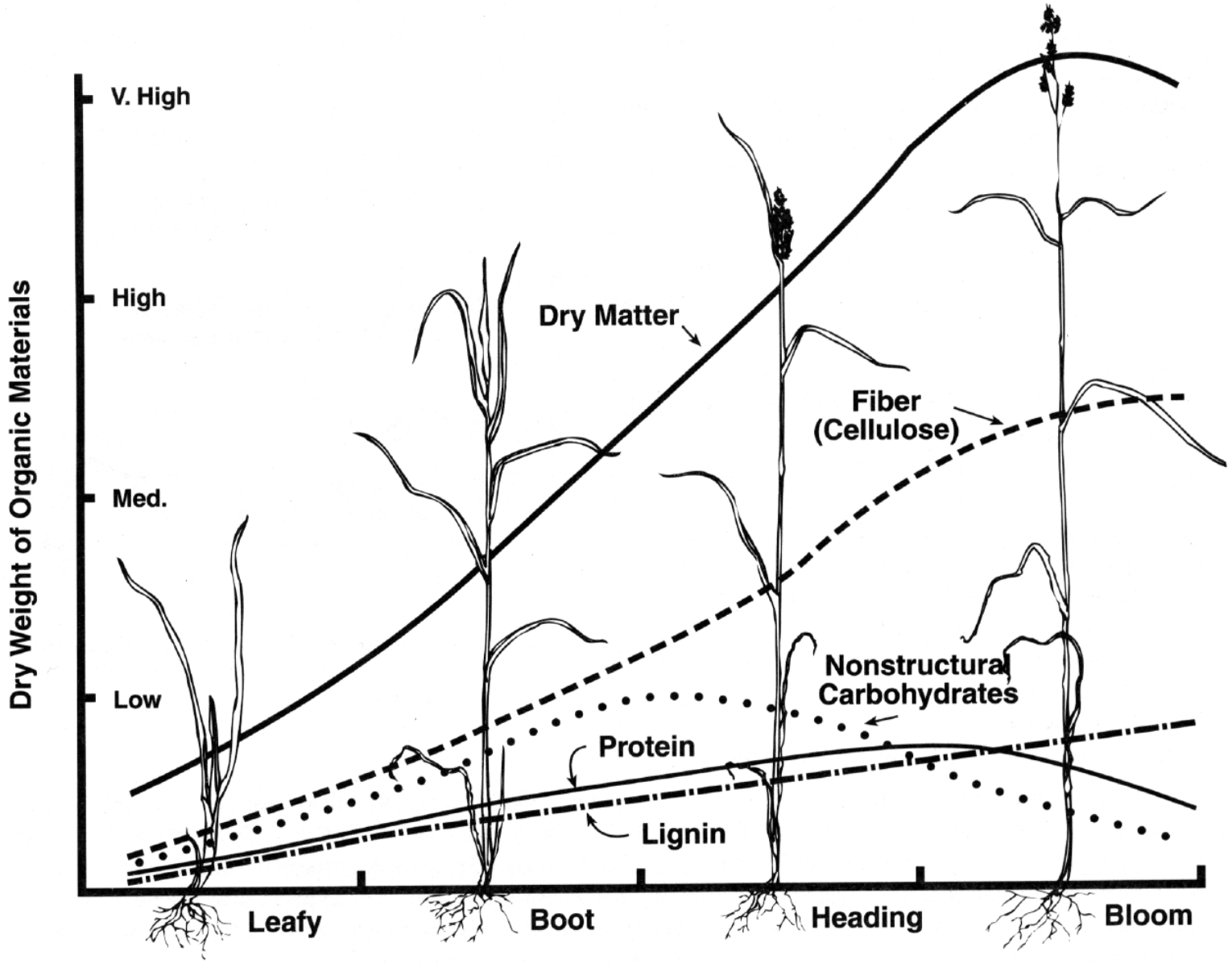

Figure 2. *As unutilized cool season grasses such as orchardgrass grow from leafy to stemmy stages, dramatic increases in dry matter yields are accompanied by increases in cell wall materials (fiber and lignin) and decreases in protein and nonstructural carbohydrates.*

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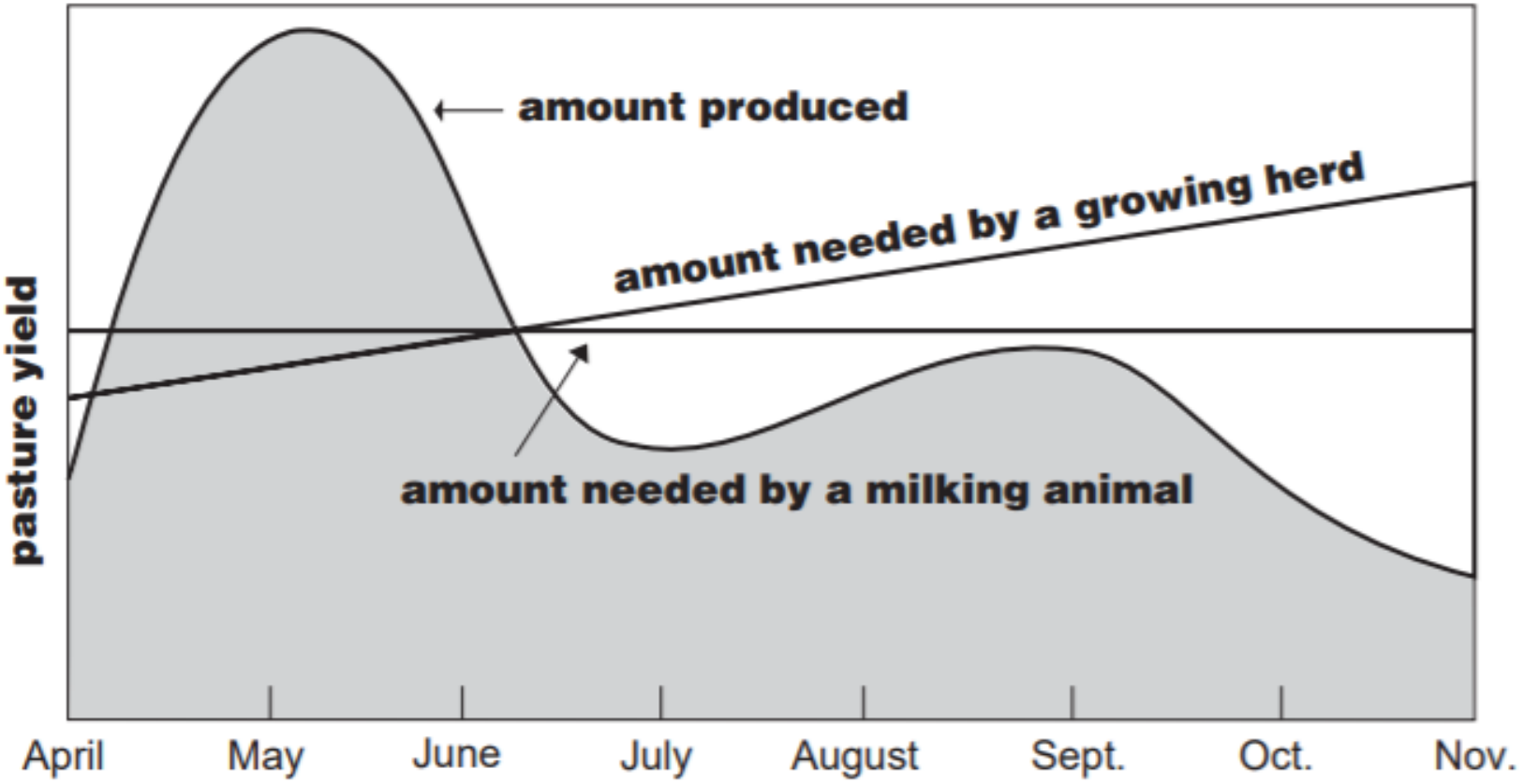
Forage (aka livestock) management

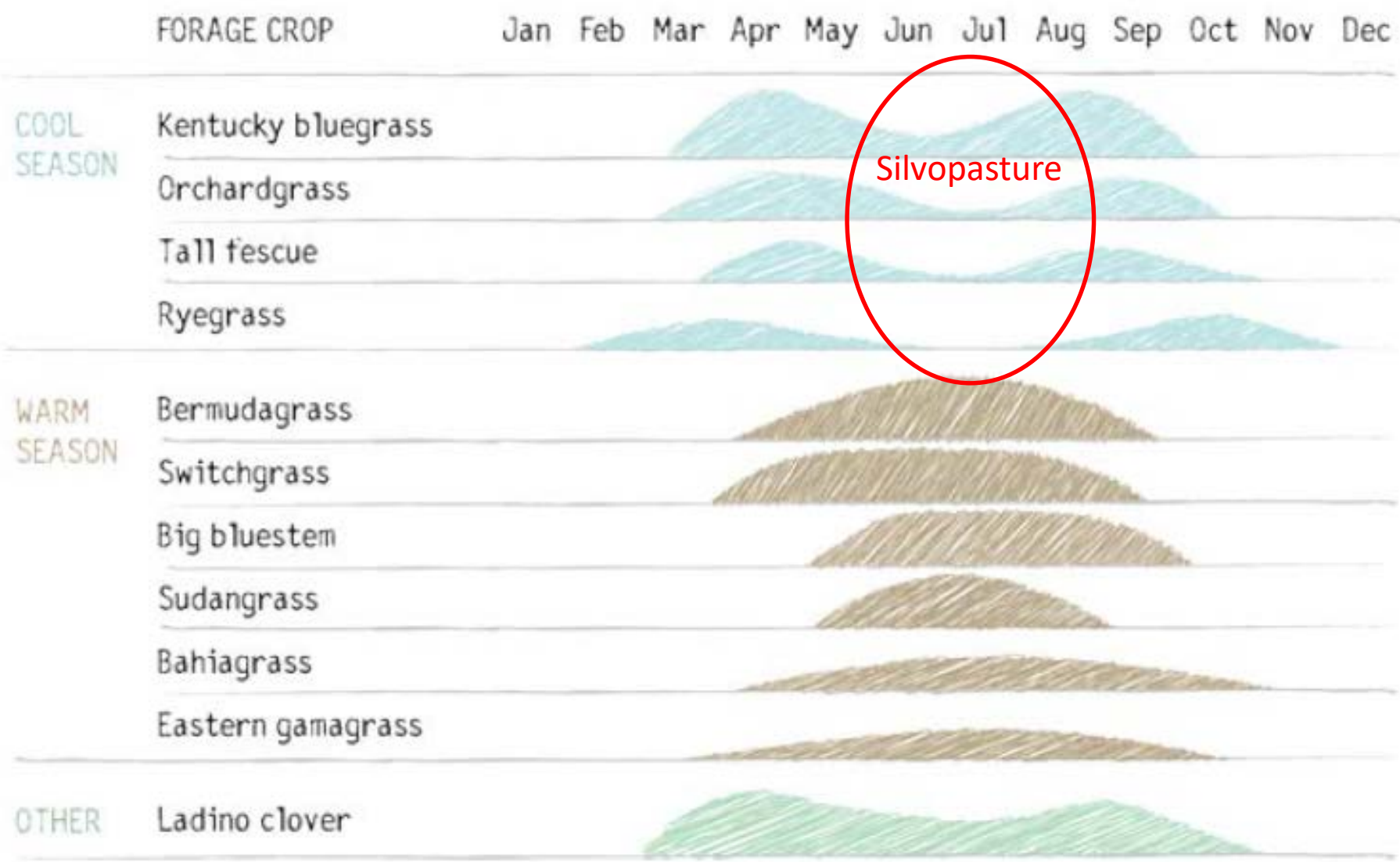
Figure 5. Typical pattern of pasture production and animal needs during the grazing season



https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1097378.pdf

Silvopasture can prolong the growth of cool season grasses into the summer due to reduced moisture stress and slower heating stage

Pasture production patterns



February 2008

Silvopasture: Establishment & management principles for pine forests in the Southeastern United States

Forest Conversion Research

Riverview, NY

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

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Sustainable Agriculture Research & Education


2016


Orchardgrass

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