
Tristate SARE Work –Sustainable Livestock Production Prac
Feb 10, 2020
Pasture Renovation
Decisions and Practices
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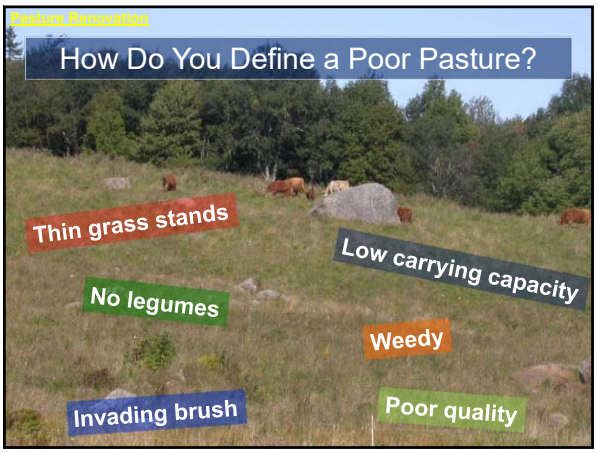
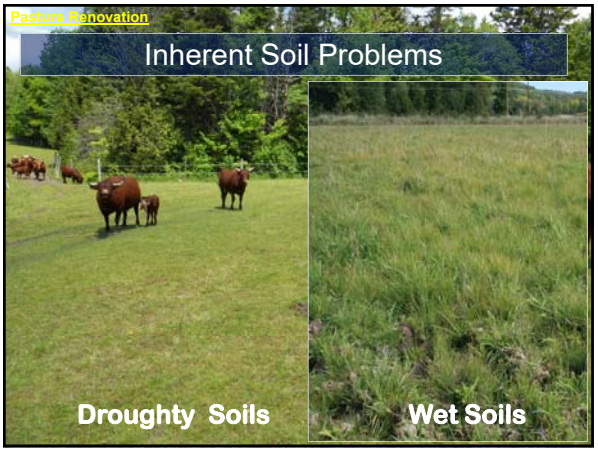
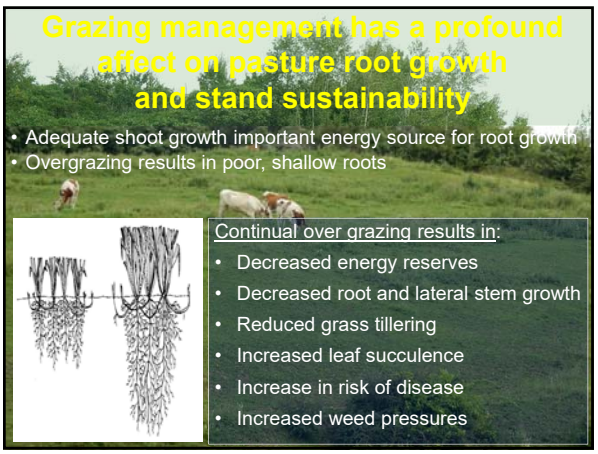
THE UNIVERSITY OF VERMONT
EXTENSION


Pasture Renovation
How Do You Define a Poor Pasture?
Thin grass stands
Low carrying capacity
No legumes
Weedy
Invading brush
Poor quality


Pasture Renovation
What Causes a Poor Pasture?
• Inherent Factors
• Management Factors


Pasture Renovation
Inherent Soil Problems
Droughty Soils
Wet Soils


Pasture Renovation
What Causes a Poor Pasture?
Management Factors
• Mismanagement
• Neglect
Overgrazing


Grazing management has a profound affect on pasture root growth and stand sustainability
• Adequate shoot growth important energy source for root growth
• Overgrazing results in poor, shallow roots
Continual over grazing results in:
• Decreased energy reserves
• Decreased root and lateral stem growth
• Reduced grass tillering
• Increased leaf succulence
• Increase in risk of disease
• Increased weed pressures

Pasture Renovation

Overgrazed Pasture

Well managed Pasture
Verses
Overgrazed Pasture

Overgrazed pasture became infested with biennial thistles which were rejected the cattle

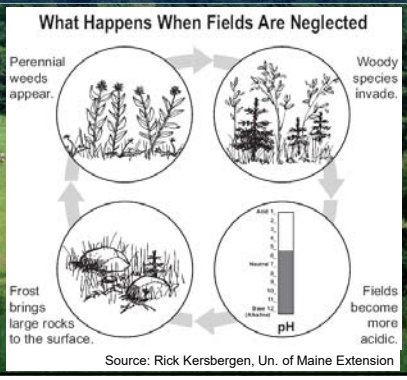
Source: Bill Curran, Penn State

Pasture Renovation

What About Undergrazing?

Pasture Renovation

Entropy Prevails in the NE



Source: Rick Kersbergen, Un. of Maine Extension

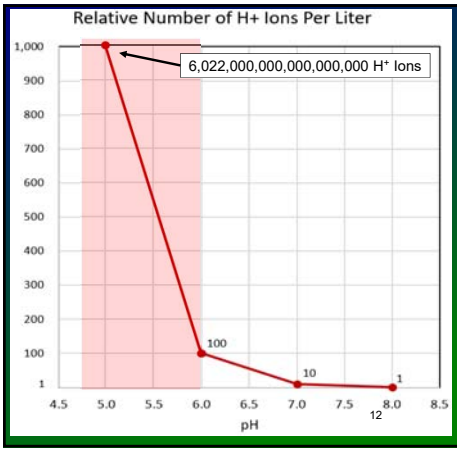
Pasture Renovation

Low Soil Fertility and pH

What is pH?

- H is the hydrogen ion (H^+) in solution
- "p" is a negative log of H^+ ion concentration

- For every unit of change in pH, there is a 10 X change in H^+ ions in the solution.



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Low Soil Fertility and pH

Summary of UVM Soil Tests for Hay and Pasture in Vermont

- ~1/3 were significantly acidic
  - Reduced N fixation
  - Aluminum toxicity
- ~1/3 were low in potassium
  - Important for winter hardiness
  - Pest/disease resistance
- More than ¼ were actually LOW in phosphorus
  - Reduced yield
- Some had all of the above!

Pasture Renovation

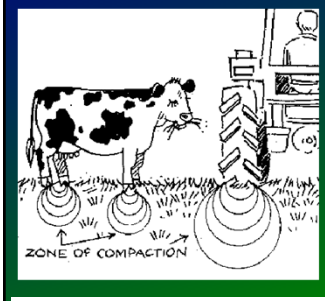
Low Soil Fertility and pH

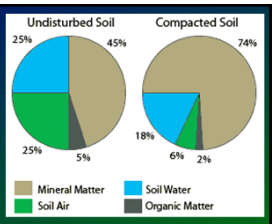
Soil pH	Nitrogen efficiency	Phosphorous efficiency	Potassium efficiency
7.0	100%	100%	100%
6.0	89%	52%	100%
5.5	77%	48%	77%

Pastures need adequate soil fertility and a soil pH between 6.0 and 7.0 for optimum root growth

A soil pH of 6.0 to 7.0 also promotes the growth and reproduction of beneficial soil microbes

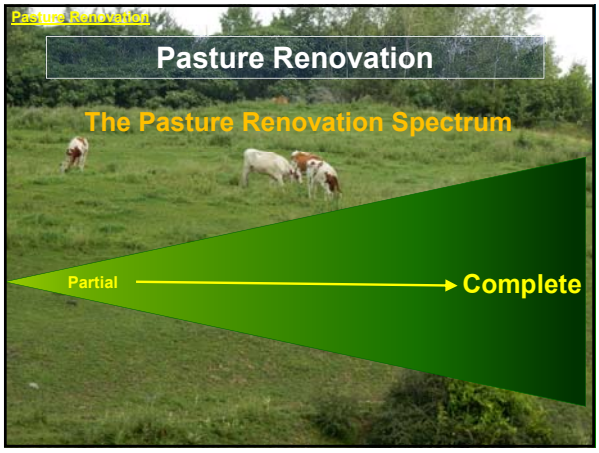
Soil compaction greatly suppresses root growth





- Physical barrier for root expansion
- Reduction in oxygen uptake
- Reduction in nutrient uptake
- Reduction in soil microbes

More disturbed soils → lower fungal populations → less glomalin produced → less macroaggregates → poorer soil structure → increased risk of compaction



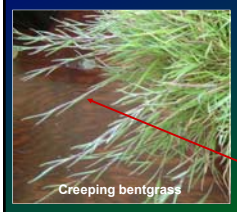
Bunch Grasses Can't Fill In

- Timothy
- Orchardgrass
- Tall and meadow fescue
- Ryegrasses
- Festulolium


Orchardgrass

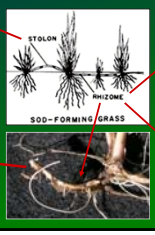

Tall fescue

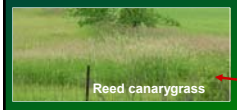
Sod-Forming Grasses Can Fill In


Creeping bentgrass

- Kentucky bluegrass
- Smooth bromegrass
- Reed canarygrass
- Quackgrass
- Bentgrasses


Kentucky bluegrass




Reed canarygrass


Smooth bromegrass

Pasture Plant ID

http://www.uvm.edu/pss/vtcrops/?Page=forage.html#Species

Pasture Renovation

Soil Test – Your Best Tool

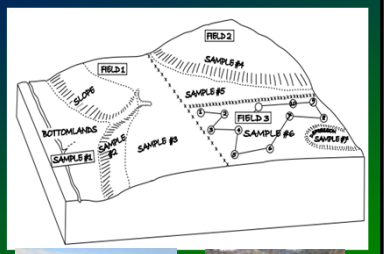
Each sample:

- 15 to 20 cores mixed in plastic bucket
- Follow soil test lab recommendations for depth
- Mix well to pull a smaller representative sample (cup) to send to the lab

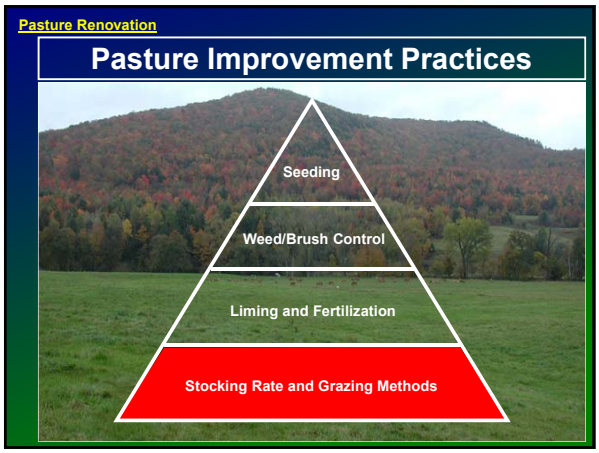
Pasture Renovation

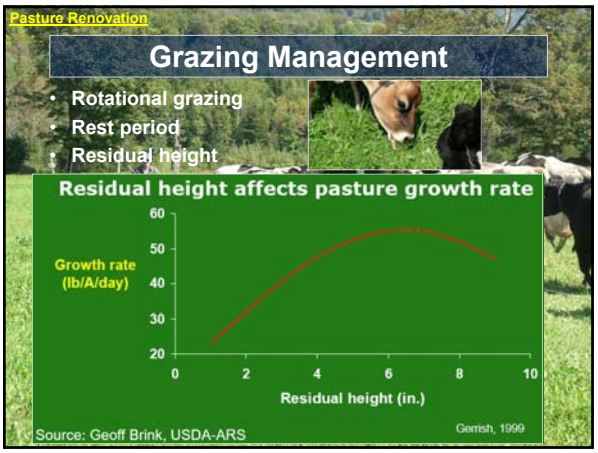
Soil Test – Your Best Tool

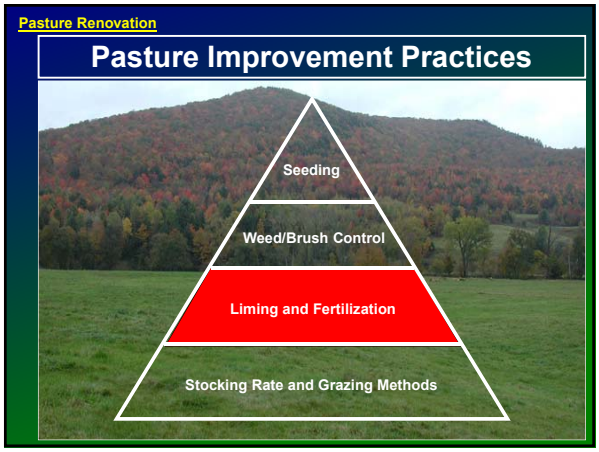
- Uniform fields are sampled in a simple random pattern across the field.
- Significant landscape or other differences? Sample separately.
- Considerations
  - Slope
  - Soil texture
  - Past history



Pasture Renovation


Pasture Renovation
Pasture Improvement Practices
Seeding
Weed/Brush Control
Liming and Fertilization
Stocking Rate and Grazing Methods


Pasture Renovation
Grazing Management
Rotational grazing
Rest period
Residual height
Residual height affects pasture growth rate
Growth rate (lb/A/day)
60
50
40
30
20
0
2
4
6
8
10
Residual height (in.)
Source: Geoff Brink, USDA-ARS
Gerrish, 1999


Pasture Renovation
Pasture Improvement Practices
Seeding
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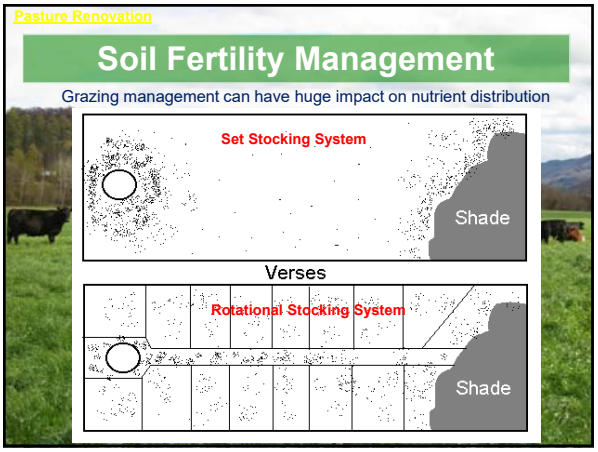
Stocking Rate and Grazing Methods


Pasture Renovation
Soil Fertility Management
Grazing management can have huge impact on nutrient distribution
Set Stocking System
Shade
Verses
Rotational Stocking System
Shade


Pasture Renovation
Soil Fertility Management
Winter feeding management can be strategic in nutrient flows on the farm
Bale Grazing


Pasture Renovation
When is the best time to apply lime?
Anytime!
Timing:
Fall
Spring
Summer
Commercial Applicators

Pasture Renovation

It takes time for change of pasture soil pH

Surface application of lime and fertilizer on old hay field in Durham, NH

Table 1. Soil pH and nutrient levels before (fall 1980) and after surface application of lime, P, and K. Sod seeding experiment.

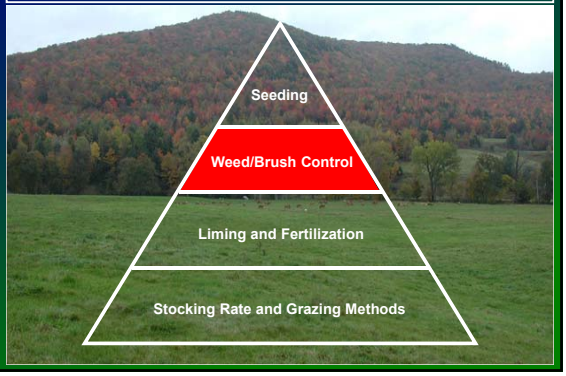
Soil component	Fall 1980	Fall 1981	Fall 1982
	Date		
	pH		
0–5 cm (0 – 2 in)	5.3	6.2	6.8
5–10 cm (2 – 4 in)	5.4	5.9	6.2
Nutrients†(0 – 4 in)	μg g⁻¹		
P	0.9(VL)	3.2(M)	4.1(M)
K	84(L)	157(M)	186(M)
Ca	414(L)	1017(H)	1212(H)
Mg	48(L)	165(VH)	177(VH)

† Soil sampled at 0- to 10-cm depth. VL, L, M, H, VH = very low, low, medium, high, and very high, respectively, and represent soil test interpretations of available nutrients, according to the modified Morgan method.

D. W. Koch and J. R. Mitchell, Agronomy J. 80:471-474 (1988)

Pasture Renovation

Pasture Improvement Practices



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Pasture Improvement – Weed/Brush

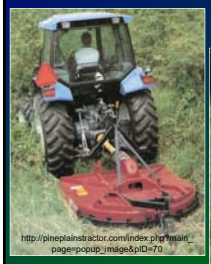

http://pineplainstractor.com/index.php?main_page=popup_image&pID=70


Image: John Deere

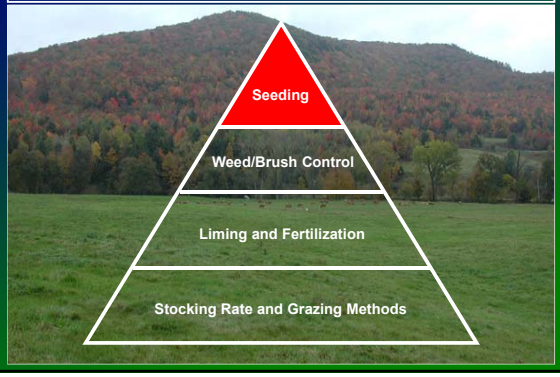
Pasture Renovation

Pasture Improvement – Weed/Brush

Multi-Livestock Species Grazing

Pasture Renovation

Pasture Improvement Practices



Pasture Renovation

Pasture Improvement Practices - Seeding

Pasture Renovation

Enhancing Thinning Pastures - Seeding

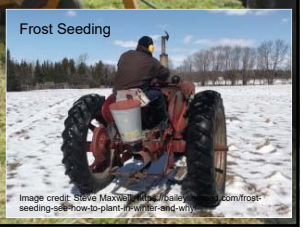


Image credit: Steve Maxwell https://baileynursery.com/frost-seeding-sed-how-to-plant-in-winter-and-why

Pasture Renovation

Enhancing Thinning Pastures - Seeding

Suppressing Existing Vegetation

- Heavy grazing (hoof and tooth method)
- Close, frequent mowing
- Herbicide options

Picture credits: Rick Kersbergen

Pasture Renovation

Enhancing Thinning Pastures or Hayfields

When interseeding with either grasses or legumes, it is best to select species which have some tolerance to shading*:

- Red clover
- Ladino clover/white clover
- Italian ryegrass/festulolium
- Orchardgrass
- Tall fescue/meadow fescue

* Other species can be successful but need heavier suppression of existing sod

Seeding Rates and Mixtures to Improve Existing Hay and Pasture Stands by Drilling

Mixed Hay Plant Species and Mixtures	lb/acre
Orchardgrass Red Clover	6-10 3-4
Tall Fescue or Meadow Fescue Red Clover	5-10 6-8
Timothy Red Clover	4-8 6-8
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10
Pasture **Plant Species and Mixtures**	**lb/acre**
Orchardgrass Red Clover	6-10 4-6
Ladino Clover Tall Fescue or Meadow Fescue Red Clover	1-2 5-10 4-6
Ladino Clover	1-2
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10

VA Cooperative Ext. Publication 418-007

Pasture Renovation

Enhancing Thinning Pastures - Seeding

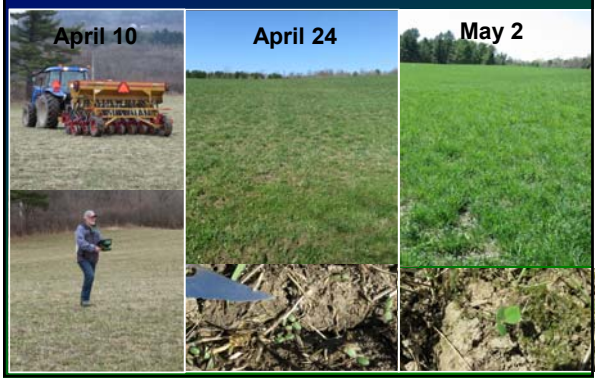
Using No-till to Establish Pasture Grasses and Forages

Enhancing Thinning Pastures - Seeding

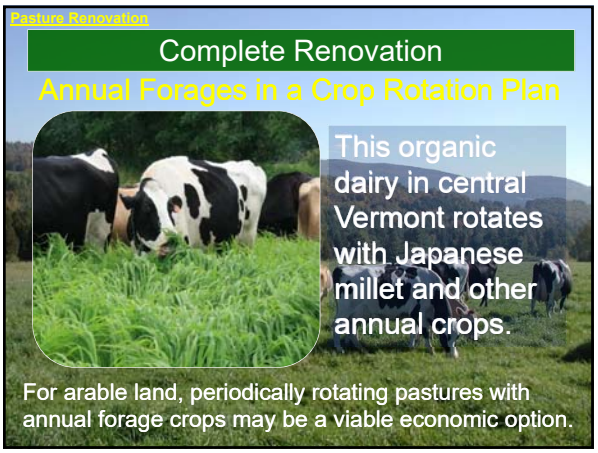
- Close monitoring is important

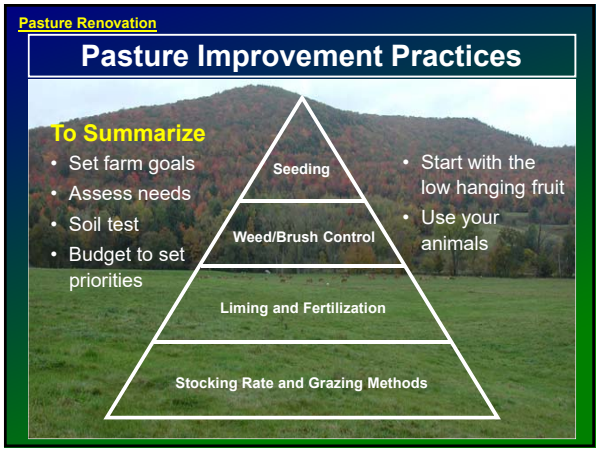
Using No-till to Establish Pasture Grasses and Forages

Duclos Farm, Weybridge, VT Seeded April 10, 2013




Pasture Renovation
Complete Renovation
Conventional tillage with seedbed preparation
Sod suppression, complete kill (herbicide) with no till


Pasture Renovation
Complete Renovation
Annual Forages in a Crop Rotation Plan
This organic dairy in central Vermont rotates with Japanese millet and other annual crops.
For arable land, periodically rotating pastures with annual forage crops may be a viable economic option.


Pasture Renovation
Pasture Improvement Practices
To Summarize
• Set farm goals
• Assess needs
• Soil test
• Budget to set priorities
Seeding
Weed/Brush Control
Liming and Fertilization
Stocking Rate and Grazing Methods
• Start with the low hanging fruit
• Use your animals


Pasture Renovation
Pasture Renovation
"All this renovation stuff is just way too expensive!"


Is your pasture a resource?
Or an expense?


Pasture Renovation
Pasture Improvement Practices
Any questions?