Pasture Renovation

Decisions and Practices

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How Do You Define a Poor Pasture?

Thin grass stands
Low carrying capacity
No legumes
Weedy
Invading brush
Poor quality

What Causes a Poor Pasture?

• Inherent Factors
• Management Factors

Inherent Soil Problems

Droughty Soils
Wet Soils

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

Management Factors
• Mismanagement
• Neglect

Overgrazing
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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

What About Undergrazing?

Entropy Prevails in the NE

What Happens When Fields Are Neglected

Perennial weeds appear

Woody species invade

Frost brings large rocks to the surface

Fields become more acidic

Source: Rick Kersbergen, Un. of Maine Extension

Low Soil Fertility and pH

pH 5.3

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!

<table>
<thead>
<tr>
<th>Soil pH</th>
<th>Nitrogen efficiency</th>
<th>Phosphorus efficiency</th>
<th>Potassium efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>6.0</td>
<td>89%</td>
<td>52%</td>
<td>100%</td>
</tr>
<tr>
<td>5.5</td>
<td>77%</td>
<td>48%</td>
<td>77%</td>
</tr>
</tbody>
</table>

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

Orchardgrass

Reed canarygrass

Richard Taylor, Un. of Delaware

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

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The Pasture Renovation Spectrum

How Much Renovation Is Needed?

Start by assessing your pastures

- What percentage of your pasture is affected?
- Is there enough good grass?
- Are there enough legumes?
- Are the pasture plants thrifty?

At least two legume plants per square foot

If there >50% bare ground

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Bunch Grasses Can’t Fill In

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

Sod-Forming Grasses Can Fill In

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

Pasture Plant ID

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

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

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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

Start with the “low hanging fruit”?
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Stocking Rate and Grazing Methods

Weed/Brush Control

Seeding

Liming and Fertilization

Grazing Management

- Rotational grazing
- Rest period
- Residual height

Residual height affects pasture growth rate

Source: Geoff Brink, USDA-ARS

Grazing management can have huge impact on nutrient distribution

Soil Fertility Management

Grazing can have huge impact on nutrient distribution

Set Stocking System

Rotational Stocking System

Winter feeding management can be strategic in nutrient flows on the farm

Bale Grazing

Anytime!

- Timing:
  - Fall
  - Spring
  - Summer

- Commercial Applicators
It takes time for change of pasture soil pH

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


<table>
<thead>
<tr>
<th>Soil component</th>
<th>Fall 1990</th>
<th>Fall 1991</th>
<th>Fall 1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH 0-2 cm (0-0.8 in)</td>
<td>5.3</td>
<td>6.2</td>
<td>6.8</td>
</tr>
<tr>
<td>2-4 cm (0.8-1.6 in)</td>
<td>5.4</td>
<td>5.9</td>
<td>6.2</td>
</tr>
<tr>
<td>Nutrients (ppm)</td>
<td>mg/kg</td>
<td>mg/kg</td>
<td>mg/kg</td>
</tr>
<tr>
<td>P</td>
<td>0.9(V)</td>
<td>3.2(V)</td>
<td>4.1(V)</td>
</tr>
<tr>
<td>K</td>
<td>56(V)</td>
<td>157(M)</td>
<td>196(M)</td>
</tr>
<tr>
<td>Ca</td>
<td>414(V)</td>
<td>1075(M)</td>
<td>1275(M)</td>
</tr>
<tr>
<td>Mg</td>
<td>49(V)</td>
<td>1685(V)</td>
<td>1777(V)</td>
</tr>
</tbody>
</table>

1 Soil sampled at 0 to 15-cm depth. VI, 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.

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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

VA Cooperative Ext. Publication 418-007

Using No-till to Establish Pasture Grasses and Forages

• Close monitoring is important

Duclos Farm, Weybridge, VT Seeded April 10, 2013

April 10
April 24
May 2

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Complete Renovation

- Conventional tillage with seedbed preparation
- Sod suppression, complete kill (herbicide) with no till

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 Improvement Practices

To Summarize

- Set farm goals
- Assess needs
- Soil test
- Budget to set priorities
- Start with the low hanging fruit
- Use your animals

Stocking Rate and Grazing Methods

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

Is your pasture a resource? Or an expense?

Pasture Improvement Practices

Any questions?

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