Understanding Pasture Soil Health, Weed Management and Extending the Grazing Season

2015 Tri-State Beef Conference
Johnny R. Rogers M.S. PAS
Amazing Grazing Program Coordinator
NC State University
What is Amazing Grazing?

An educational program striving to improve pasture management through a better understanding of Pasture Ecology

- Training for advisors. Extension agents, conservationists, veterinarians, industry consultants
- Training for producers
- Publications
- Hands-on workshops
- Demonstrations
Well managed pasture/range is one of the hidden resources that will be key to the future of the world.

Thoughtful pasture management leads to improved:

- soil health
- water infiltration
- animal well-being
- economic returns
- lifestyle
Improving Soil Health in Pasture Based Livestock Systems

Conservation Innovation Grant Project
Principle Investigator: Dr. Matt Poore
Project Coordinator: Johnny R. Rogers
Soil Health Principles

- Keep plants growing throughout the year to feed the soil
- Use plant diversity to increase diversity in the soil
- Keep the soil covered as much as possible
- Manage soils more by disturbing them less
Soil Health

Physical
- Aggregation and Structure
- Surface Sealing
- Compaction
- Porosity
- Water Movement and Availability

Chemical
- pH
- Soluble Salts
- Sodium
- Nutrient Holding Capacity
- Nutrient Availability

Biological
- Macrofauna
- Microfauna
- Microorganisms
- Roots
- Biological Activity
- Organic Matter

Soil Health
Keep Plants Growing Throughout the Year to Feed the Soil
Plant Diversity leads to Root Diversity
Keep the Soil Covered as Much as Possible

- Proper stock density tramples residue onto soil surface
- Keeps the soil cool for optimal microbial activity
- Water infiltration
  - Effective rainfall
- Evaporation/transpiration
Temperature impacts plant tissue survival, soil organisms and animal comfort.
Manage soils more by disturbing them less
“The Importance Soil Structure”
How can we disturb the soil in grazing systems?

- Grazing
- Equipment traffic
- Mowing
- Fertilizer/manure
- Herbicides
- Parasite/fly control
Soil Health Points to Consider

- Soil is the foundation of pasture systems.
- Embrace the principles of soil health.
- Develop methods to work with the soil biology.
- Soil will respond to management.
My Perspective on Weeds in Pasture Systems
What is a Weed?

A weed is a plant considered undesirable in a particular situation, "a plant in the wrong place". Examples commonly are plants unwanted in human-controlled settings, such as farm fields, gardens, lawns, and parks. Taxonomically, the term "weed" has no botanical significance, because a plant that is a weed in one context is not a weed when growing in a situation where it is in fact wanted, and where one species of plant is a valuable crop plant, another species in the same genus might be a serious weed, such as a wild bramble growing among cultivated loganberries.

Source: https://en.wikipedia.org/wiki/Weed
TDN and Crude Protein of various forages and browse species

% of Dry Matter

Fescue, Veg
Fescue, HD
Fescue Leaf
Clover
Bermuda
Gama
Switchgrass
Nimblewill
Honeysuckle
Greenbriar Leaf
Blackberry leaf
Crown Beard leaf
Microstegium
Privette leaf
Plants as indicators of problems

- Acid Soils tolerant – Sorrels, Docks, Fingerleaf Weed, Lady’s Thumb, Horsetail, Hawkweed and Knapweed.

- Crust Formation & or Hard Pan Soils – Field Mustard, Horse Nettle, Penny Cress, Morning Glory, Quack Grass, Camomiles and Pine Apple weed.

- Cultivated Soils – Lambsquarter, Plantain, Chickweed, Buttercup, Dandelion, Nettle, Prostrate Knotweed, Prickly Lettuce, Field Speedwell, Rough Pigweed, Common Horehound, Celandine, Mallows, Carpetweed.

- Salty Soils – Shepherd’s Purse, Russian Thistle, Sea Plantain, Sea Aster,

- Plant toxins.. Ranunculus contains a substance which disturbs or even prohibits growth of clovers.

Ehrenfried Pfeiffer (1946).
Different forage species and their relative root depth and structure. Image by Integrity Soils.
Horse nettle Grazing

Before Grazing

After Grazing
Weed Management Points to Consider

- Planning and observation
  - Do you have a weed problem?
- Grazing Management
  - Sustained forage resource
  - Evaluate stocking rates & carrying capacity
  - Rest/Recovery period
  - High density grazing
- Forage specie diversity
- Protect and feed the soil
- Strategic mowing & herbicide use
Extending the Grazing Season

- All forages can be stockpiled
- Excellent livestock nutrition
- Rested plant
- Feeds the Soil Food Web
- Nutrient Distribution
- Ground cover
- Limited equipment (Safety)
Grazing Stockpiled Fescue

- Select fields with a high fescue content.
- Clip/graze to 3-4 inches residue
- Fertilize 50 units N
  - Late Aug. to Mid-Sept. gives the best yield.
  - Late-Sept to early Oct. gives best quality grazing.
- Consider livestock nutrient requirements.
- Dry Fall
  - Split N applications
  - Buy other feedstuffs
Strip graze with 1-3 day moves
- use daily moves during rain/ice/snow to minimize trample damage.
- Graze stockpile that contains clover, other cool season forages (i.e. orchard grass) and/or warm season species first.
- Save heavy fescue field for later grazing
- Feeding some hay with stretch stockpile and tighten cows up.
- Do not run a brood stock operation without stockpiled forage.
For every $1.00 your cattle consume they will deposit approximately $0.85 somewhere on your farm. Will they deposit it in the correct location?
Extending the Grazing Season with Annual Forages

- Higher quality feedstuff
- Alternative to toxic fescue
- Pasture renovation
- Soil Health Improvement
### Summer Annual Mixtures

<table>
<thead>
<tr>
<th>Forage Type</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Simple Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td>30%</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow Peas</td>
<td>25%</td>
<td>25%</td>
<td>42%</td>
<td>55%</td>
<td>70%</td>
</tr>
<tr>
<td>Sorghum-Sudan</td>
<td>17.5%</td>
<td>25%</td>
<td>18%</td>
<td>10% + 5%</td>
<td>30%</td>
</tr>
<tr>
<td>Pearl Millet</td>
<td>5%</td>
<td>10%</td>
<td>6%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>German Foxtail</td>
<td>5%</td>
<td>5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>7.5%</td>
<td>5%</td>
<td>4%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td>5%</td>
<td></td>
<td>5%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Turnips</td>
<td>2.5%</td>
<td>2.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rape</td>
<td>2.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pasja Brassica</td>
<td></td>
<td></td>
<td></td>
<td>2.5%</td>
<td></td>
</tr>
<tr>
<td>Mastergraze Corn/Soybean</td>
<td></td>
<td></td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-Raptor Brassica</td>
<td></td>
<td></td>
<td></td>
<td>5%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Summer Annual Mixtures
# Winter Annual Mixtures

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Simple Mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryegrass</td>
<td></td>
<td>6.6%</td>
<td>7.1%</td>
<td></td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>18%</td>
<td>10.6%</td>
<td>9.9%</td>
<td>18%</td>
</tr>
<tr>
<td>Oats</td>
<td>82%</td>
<td>19.9%</td>
<td>20%</td>
<td>82%</td>
</tr>
<tr>
<td>Vetch</td>
<td></td>
<td>13.2%</td>
<td>12.4%</td>
<td></td>
</tr>
<tr>
<td>Winter Pea</td>
<td></td>
<td>23.9%</td>
<td>23.6%</td>
<td></td>
</tr>
<tr>
<td>Turnip</td>
<td></td>
<td>1.6%</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td></td>
<td>3.9%</td>
<td>3.7%</td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td>19.9%</td>
<td>19.9%</td>
<td></td>
</tr>
</tbody>
</table>
Winter 2014-15
Oats and Crimson Clover
Observations from Using Annual Forages

- Burn down with glyphosate is important to establishment with Summer annuals.
- Very effective in eliminating fescue and reducing some weeds populations.
- Provides excellent quality forage.
- Improving soil health.
- Impressive yields on marginal soils with limited fertilizer.
- Establishment costs is a concern.
- Simple mix vs. Diverse mix?
- Stagger planting dates
  - Reduce weather risk
  - Stage grazing intervals
- Spend a lot of time waiting to graze.
Summary

- Soil is a precious resource that needs management.
- Developing and executing a sound grazing plan will improve soil health.
- Understand that all plants contribute to pasture ecology (even weeds).
- Grazing management can prevent an over population of undesirable plants species.
- Evaluate alternatives for extending the grazing season and compare to feeding stored forages.
- Stockpiling forages and strip grazing is a great place to start.
- Pasture based livestock systems using sound grazing principles provide tremendous economic and ecological benefits to our society.
Thank you

Johnny R. Rogers
jrroger3@ncsu.edu