Hay is for Horses, but Pastures too: Keeping them Green and Productive

Rocky Lemus
Equine Interest Group
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Pasture Management

- Many pastures that are presently unproductive can be improved with a little management.
- There are several methods that may apply to improving pastures.

Relative Proportions of Grass, Forbs, and Browse in the Diets of Livestock

<table>
<thead>
<tr>
<th>Type of Forage</th>
<th>Cattle</th>
<th>Horses</th>
<th>Goats</th>
<th>Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasses</td>
<td>65-75</td>
<td>70-80</td>
<td>20-30</td>
<td>45-55</td>
</tr>
<tr>
<td>Legumes and broadleaf</td>
<td>20-30</td>
<td>15-15</td>
<td>10-30</td>
<td>30-40</td>
</tr>
<tr>
<td>Browse</td>
<td>5-10</td>
<td>0-5</td>
<td>40-60</td>
<td>10-20</td>
</tr>
</tbody>
</table>

Grazing Behavior of Horses

- The anatomy of horses dictates that they graze closer to the ground than other species.
  - Horses also tend to be more selective grazers.
  - They will readily locate to graze the highest quality forage.
- This implies good pasture management through rotation must be accomplished to effectively use the pasture.
The equine digestive system is designed for forage consumption.

Factors Affecting Nutrient Availability
- Soil type (composition)
- Soil pH
- Nutrient removal
  - Harvesting
  - Grazing
  - Other biological activities

The Soil
- Evaluate Pasture in the Spring
  - Soil Testing
    - How to take a soil sample?
  - Fertilizing
    - What the soil test report tells me?
  - Liming
    - Making sure that all the nutrients requirements depend on pH

Figure 2. Seasonal growth distribution of cool- and warm-season grasses.
**PH Effect on Nutrient Absorption**

<table>
<thead>
<tr>
<th>pH</th>
<th>4.0</th>
<th>4.5</th>
<th>5.0</th>
<th>5.5</th>
<th>6.0</th>
<th>6.5</th>
<th>7.0</th>
<th>7.5</th>
<th>8.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
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<tr>
<td>Phosphorous (P)</td>
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<tr>
<td>Potassium (K)</td>
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<td></td>
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<tr>
<td>Calcium Oxide (CaO)</td>
<td></td>
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<td></td>
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<tr>
<td>Magnesium Oxide (MgO)</td>
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<tr>
<td>Boron (B)</td>
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<tr>
<td>Manganese (Mn)</td>
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<tr>
<td>Iron &amp; Aluminium (Fe &amp; Al)</td>
<td></td>
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</tr>
<tr>
<td>Copper &amp; Zinc (Cu &amp; Zn)</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Optimal soil nutrients level</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**What Nutrient Levels are Acceptable in the Soil?**

- **What my soil should contain?**
  - 40 to 60 units of P (phosphate)
    - It takes about 10 units of P₂O₅ to raise the soil one unit
  - 220 to 260 units of K (potash)
    - It takes about 2.5 units of K₂O (potash) to raise the soil one unit

**Soil Nutrients**

- **Maintenance face?**
  - If at least 30% legume add, P and K based on soil test
  - If pasture is less than 30% legume, then N, P, and K will be needed.
  - 50 lbs (units) of nitrogen (~150 lb of ammonium nitrate or 110 lbs of urea)
    - Can give an additional 1,000 lbs of dry matter and increase crude protein in the grass by two units.
    - Use split applications for higher rates
      - Late March to early April
      - Late August when fall rains begin
Nutrient Management

• Do I need to remove horses when applying granular fertilizer?
  – NO
  – Just be careful not to have fertilizer spills where a horse could eat enough of the material to be toxic.

• Do I need to remove horses when applying liquid fertilizer?
  – YES
  – Liquid nitrogen is a salt that could burn the grass and concentrate in the leaves for longer period.
  – Keep horses off the pasture until rain comes and wash the fertilizer off the plants into the soil.

Nutrient Management

• Break the manure piles to increase nutrient cycling.
  – Should be done in summer because hot dry summer increases microbial activity

Species Selection

• Important factors
  – Intended Use.
  – Animal Requirements.
  – Environmental Constrains.
  – Management Constrains.

Forage Species for Pasture

• Tall Fescue
  – Vigorous sod-forming cool season grass
  – Can withstand much trampling
  – Suggested for areas of surface abuse
  – Use endophyte free or novel endophyte
    • KY31 can cause problems with decrease milk production, creased growth, and placental abnormalities
    • Remove pregnant mares from endophyte infected fescue during the last 120 days of pregnancy
Are Pregnant Mares Safe in Max Q?

<table>
<thead>
<tr>
<th>Pasture</th>
<th>Number of Days Early (-) or Late (+) Foaling</th>
<th>Foaling Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endophyte Free (EF)</td>
<td>-9 to +15 (average 0.4 late)</td>
<td>None</td>
</tr>
<tr>
<td>Jesup MaxQ</td>
<td>-12 to +2 (average 5 day early)</td>
<td>None, except one partial placental retained</td>
</tr>
<tr>
<td>Toxic Tall Fescue (KY31= E+)</td>
<td>+6 to +21 (average 13 day late)</td>
<td>Late births, Difficult births (2), Retained placenta (3), Poor mammary development (4), abortion (1).</td>
</tr>
</tbody>
</table>

Source: Mississippi State University

Forage Species for Pasture

- **Bermudagrass**
  - The seeded types, which include common bermudagrass, offer more flexibility in establishment method and may be a better option if you have a relatively small land area.
  - Seeded bermudagrass also tend to have lower, denser growth, which can mean better persistence under heavy grazing.
  - In horse pastures that are subject to high grazing pressure and traffic, common bermudagrass may have certain advantages.

- **Bahiagrass**
  - Tolerates low fertility and overgrazing than bermudagrass
  - Tolerates high stocking rates (thick sod)
  - Longer growing season than bermudagrass
  - Keep it short (4 to 6 inches)
  - Tifton 9, Pensacola, Argentine, UF-Riata
  - It has a longer growing season than bermudagrass (April through October)

Forage Species for Pasture

- **Bermudagrass**
  - Well adapted for grazing and is very productive between May and September.
  - Hybrid types will typically produce higher dry matter yields than the seeded types and will keep higher total digestible nutrient (TDN) levels at similar stages of maturity.
  - You can do vegetative propagation from March through April.

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Warm-season Grasses

• Dallisgrass
  – Close to bahiagrass, but less persistence.
  – Requires higher fertility soils with better water-holding capacity.
  – Quality is generally better than both bahiagrass and bermudagrass.
  – Seed viability is often very low.
  – Health problems: ergot (fungus) forms in the seed head.

Forage Species for Pasture

• Crabgrass
  – It volunteers in Mississippi pastures and reseeds itself very well.
  – You can seed it from March through May.
  – Most crabgrass is “common,” but a two varieties called red River and Quick-n-Big has been developed specifically for grazing.
  – Crabgrass pastures are productive from May through September and have nutritional quality that is generally higher than perennial warm-season grasses.
  – Crabgrass has a more even growth profile through the summer than the other warm-season annual species, such as millet, so it is often easier to manage and maintain nutritional quality.

Forage Species for Pasture

• Annual Ryegrass
  – Very palatable to horses and provides high quality forage from November through May.
  – In most situations you can broadcast the seed or drill it into existing bermudagrass or bahiagrass sod in September and October.
  – Annual ryegrass can reseed very well, and once seed are in the soil, some will germinate each year.
  – Grazing down or clipping summer growth in the fall and lightly harrowing the ground will let the annual ryegrass seed germinate.

Not Recommended Species

• Johnsongrass, Sorghum, Sudangrass, and Sorgum x Sudan Hybrids
  – Prussic acid production
  – Problems:
    • Cystitis, paralysis, and urinary tract disorders
Suitability of Forage Species for Grazing

<table>
<thead>
<tr>
<th>Species</th>
<th>Frequent Close Grazing</th>
<th>Rotational Grazing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legumes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alfalfa</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Red clover</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>White clover</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td><strong>Grasses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual ryegrass</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Bahiagrass</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Bermudagrass</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Native warm-season grass</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Tall fescue</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

- ○ Not Suitable
- ● Suitable
- ●● Highly Suitable

Legume Selection?

- Important in pasture:
  1. **Legumes are nitrogen fixers**
     a) When 35% of the pasture are legumes, adequate nitrogen is supplied by the legume to maintain productivity of the grasses.
     b) Economics: legumes vs. fertilizer
  2. **Legumes contain about 2X the protein levels of grasses**
     a) Increase the nutrient levels in the pasture
  3. **Legumes enhance the acceptability, digestibility, and palatability of the pasture.**

Legume Selection?

- **Perennial Clovers**
  - White clover (best suited)
    - Ladino-type (high yielding, low persistence)
    - Dutch-type (resistance to close grazing, tolerance to low fertility, longer persistence)
- **Annual Clovers**
  - Crimson, berseem, ball, and arrowleaf clover.
  - **Do Not** use alsike clover
    - Cause sensitivity to light and possible liver damage

Legumes
Legume Selection?

- **Alfalfa**
  - Excellent quality
  - Very productive
  - Good summer growth
  - Good drought tolerance
  - Requires good drainage
  - Requires high pH
  - Varieties with improved grazing tolerance
  - Prone to insect damage
  - Bloat hazard

Legume Selection?

- **Red Clover**
  - True clover included in pastures for horses where tall fescue is being seeded
  - More tolerant to poorer drained soils and lower pH.
  - Needs to be reseeded more often in MS because it usually a biennial forage due to environmental conditions.
  - Bloat potential

Legume Selection?

- **White Clover**
  - Seed at 2 lb/ac with 15 lb/ac tall fescue
  - Shallow-rooted perennial
  - Makes little growth during hot, dry summer weather
  - Prostrate growth (close to the ground) that is well suited for pastures
  - Can tolerate cloze grazing
  - Bloat potential
  - Use the ladino type
    - Regalgraze, Durana, Patriot

Legume Selection?

Weed Control

- Weeds can be control by clipping or herbicide applications
  - Clipping should be done when plants area flowering and before seed heads are develop
    - May require several clippings a year
  - Spray weeds when they are 2 to 4”.
    - Spring is a good time.
    - Read the label
    - Grazing restrictions are important
Weed Control

• No Grazing Restrictions
  – Chaparral, Cimarron Plus, Metsulfuron, Outrider, Overdrive, Grazon Next (aminopyridil)
  – Still be cautious and use judgment

• 7 Day Restriction
  – 2,4-D Amine or ester (1 to 4 pt/ac)

• Check the MSU Weed Control Guidelines for more information.

Pasture Management

• Every 3 - 5 years reseed your pastures
  – Hoof action and heavily grazed areas are a major issue
  – Very expensive to do.
  – Rotation is a cheaper approach.

• Important to have a sacrifice field
  – Winter feeding
  – Wet conditions

Pasture Renovation – Grazing Management

• Reasons
  – Overgrazed, low productivity and more weeds than desirable plants
  – Owner wants to establish a more productive species

• Let plants to establish before start any heavy grazing.
  – Mayor issue with stand failure (especially with fescue)

When to Graze?

• How much dry matter a horse consume?
  – 1.5 to 3% of their body weight
  – At least 50% of dry matter should be forage

• Rest periods are important
  – They can change with species
  – Let growth to get 10-12” before start grazing.
**Optimal Rest Period for Forage Species**

<table>
<thead>
<tr>
<th>Forage Species</th>
<th>Weather</th>
<th>Cool</th>
<th>Hot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool-season grasses</td>
<td></td>
<td>10-14</td>
<td>35-50</td>
</tr>
<tr>
<td>Annual ryegrass, tall fescue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warm-season grasses</td>
<td></td>
<td>35-40</td>
<td>14-21</td>
</tr>
<tr>
<td>Bahiagrass, bermudagrass, dallisgrass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legumes</td>
<td></td>
<td>21-28</td>
<td>30-40</td>
</tr>
<tr>
<td>Alfalfa, clovers</td>
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</tbody>
</table>

**Pasture Needs for a Horse?**

- **How much land?**
  - Mare with a foal = 1.75 to 2.0 acres.
  - Yearlings and mature horse = 1.5 to 2 acres.
  - Weanlings = 0.5 to 1.0 acre.

- **Grazing Management**
  - How many grazing hours a day.
    - Mares 17 hrs a day.
    - Cattle 8 hrs a day.

**Pasture Management - Trampling**

- Ensure a good level of soil fertility
- Use strong sod-forming grasses and legumes that are tolerant to trampling for heavy traffic area
- Improve drainage where practical
- Use managed grazing with adequate rest periods
- Limit the extend of trampling damage by using only one area as much as possible for grazing during wet periods.

**Pasture Management - Grazing**

- The goal of grazing management should be to supply the maximum amount of nutrition possible from the forage present while maximizing yield and stand persistence.
- Rotational grazing allow overgrazed pastures to rest.
Rotational Grazing

- Dividing the total pasture area into smaller areas or paddocks.
  - Allows plants to rest and reestablish the plant root reserves.
  - Length of rest period depends on the species type (cool- vs. warm-season).
  - Pasture should not be grazed to less than a 3” stubble height.

Rotational vs. Continuous Grazing Effects on Yearling Horses

<table>
<thead>
<tr>
<th>Grazing Method</th>
<th>Daily Gains (lb)</th>
<th>Days of Grazing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>0.52</td>
<td>25</td>
</tr>
<tr>
<td>Rotational</td>
<td>1.35</td>
<td>37</td>
</tr>
</tbody>
</table>

Lewis, 1995

Considerations When Planning Paddocks

- Shape and layout
  - Rectangular shapes better horse, square for cattle.
  - Provides more exercise area.
  - Minimum with 20 to 40 ft.

- Gate size and placement
  - Closes to the direction of travel.
  - Wide enough to get multiple horses through at once and to get equipment through.

Considerations When Planning Paddocks

- Water availability
  - Place water troughs in the fence line near the middle of the paddock.
  - Require 0.5 gal/cwt for maintenance.
  - High temperature or work may increase to 1.5 gal/cwt or more.
  - Type of feed affect water intake.
  - 1,000 lb mare needs 4 gal/day for lactation.
Considerations When Planning Paddocks

- Fencing
  - Safety
  - Security
  - Ease of maintenance
  - Ease of installation
  - Cost
  - Appearance

Stocking Rates

- One horse can be maintained on:
  - ½ acre pasture, if turn-out time is <3 hr/day.
  - 1 acre of pasture, if turn-out time is 3 to 8 hr/day.
  - 1.5 acre of pasture, if turnout time is 8 to 12 hr/day.
  - >2 acres of pasture with unlimited turnout time.

Stocking Rates

- The stocking rates in previous slide can be increased with elevated levels of management
  - Mowing, fertilizing, over-seeding, and rotating pastures can allow higher animal densities while maintaining proper vegetative cover.

Stocking Rates

- Example: 6 acres of land, 3 mares late lactation (1000 lb), 7 days grazing period and 20 days rest
  - 4 Paddocks
  - DM intake in 30 lbs (3% BW)
  - Pasture production 1500 lb/ac
  - Grazing efficiency 50%
  - Acres per paddock = 0.9
  - Total acres per grazing paddock = 3.4
  - Stocking rate = 0.9 head/ac
  - Stocking density = 3.5 head/ac
Stocking Rate

<table>
<thead>
<tr>
<th>Tall Fescue/White Clover</th>
<th>Bermuda/Ryegrass/Annual Clover</th>
<th>Sacrifice Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
</tbody>
</table>

Grazing Frequency and Grazing Intensity Combinations Within Grazing Systems

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Frequency (Rotation Rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very High (&lt;15d)</td>
</tr>
<tr>
<td></td>
<td>High (15-25d)</td>
</tr>
<tr>
<td></td>
<td>Medium (~30d)</td>
</tr>
<tr>
<td></td>
<td>Low (&gt;40d)</td>
</tr>
<tr>
<td></td>
<td>Very Low (4-6 wk)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Fall &amp; Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Summer</td>
</tr>
<tr>
<td>Low</td>
<td>Late-spring/Early-summer</td>
</tr>
<tr>
<td>Very Low</td>
<td>Spring</td>
</tr>
</tbody>
</table>

Cost of Subdividing the Pastures

- **Initial Cost**
  - Six Acre Pasture
    - Total cost of converting this pasture to a three-paddock rotation is estimated to be $1,067.30.
    - If these costs are spread out over five years, the annual cost for this improvement is $213.46.
  - Cost associate fencing, water, and shade.

Savings and Return on Investment

- Horse owners would recoup these costs by feeding less hay during the winter.
- Assuming the horses are fed 25 pounds of good-quality (mixed alfalfa/grass) hay per head per day during the winter at a cost of $175/ton, the cost per day of feeding these three horses is $6.56.
- Based on the estimated annualized cost of $213.46 per year, this horse owner would need to get an additional 33 grazing days per year to recoup this investment.
- This amounts to an attainable goal of only one month of additional grazing per year.
Questions?

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