The Importance of Maintaining Proper Grazing Height

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University of Missouri Extension
I. Background
II. Grazing Height Research
III. Tall Fescue Grazing Height & Toxin Concentrations
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Background
What you learned at grazing school.
Take half, leave half
Background
What you learned at grazing school.

• Take half, leave half
Background
What you learned at grazing school.

- Take half, leave half
I. Background

II. Grazing Height Research

III. Tall Fescue Grazing Height & Toxin Concentrations
Overgrazing is removing too much of the canopy too often.

Dry Matter Yield at Various Cutting Heights

Species

Per. Ryegrass

Tall Fescue

Dry Matter Yield (lb/acre)

0

2000

4000

6000

8000

10000

12000

1 inch

2 inches

3 inches

4 inches

5 inches

6 inches

<table>
<thead>
<tr>
<th>% Leaf Removed</th>
<th>% Root Growth Stopped</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>2 to 4</td>
</tr>
<tr>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>70</td>
<td>78</td>
</tr>
<tr>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>
Grazing Height Research

- Allows plant to recover completely after grazing
  - Recovery of shoots and roots
- Allows for plant and stand persistence
### Grazing Height Research

- **Nutrient Profile of Nine-Inch Tall Orchardgrass**

<table>
<thead>
<tr>
<th>Bite</th>
<th>CP</th>
<th>NDF</th>
<th>NeL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>27.4</td>
<td>38.5</td>
<td>0.79</td>
</tr>
<tr>
<td>2nd</td>
<td>22.9</td>
<td>44.6</td>
<td>0.76</td>
</tr>
<tr>
<td>3rd</td>
<td>14.0</td>
<td>60.0</td>
<td>0.67</td>
</tr>
</tbody>
</table>

- 1st bite: leaves low fiber
- 2nd bite
- 3rd bite: stems high fiber
Grazing Height Research
Effect of Residual Height on Total Annual Forage Yield

Dry Matter Yield at Various Cutting Heights

<table>
<thead>
<tr>
<th>Species</th>
<th>1 inch</th>
<th>2 inches</th>
<th>3 inches</th>
<th>4 inches</th>
<th>5 inches</th>
<th>6 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per. Ryegrass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tall Fescue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Grazing Height Research
Residual Effects on Orchardgrass Grazed at 12 inches

<table>
<thead>
<tr>
<th>Residual Height (inches)</th>
<th>Number of Grazing Events</th>
<th>Rotation Time Avg. (days)</th>
<th>Rotation Yield Avg. (lb/A)</th>
<th>Annual Yield (lb/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>24</td>
<td>750</td>
<td>4500</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>32</td>
<td>900</td>
<td>5400</td>
</tr>
<tr>
<td>1.5</td>
<td>4</td>
<td>44</td>
<td>1250</td>
<td>5000</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Residual Height (inches)</th>
<th>Annual Yield (lb/A)</th>
<th>Yield Value as Hay ($/A)</th>
<th>Yield Value as Milk ($/A)</th>
<th>Date Grass at 12 inches*</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4500</td>
<td>270</td>
<td>1270</td>
<td>April 28</td>
</tr>
<tr>
<td>3</td>
<td>5400</td>
<td>325</td>
<td>1520</td>
<td>May 4</td>
</tr>
<tr>
<td>1.5</td>
<td>5000</td>
<td>300</td>
<td>1410</td>
<td>May 11</td>
</tr>
</tbody>
</table>

* Date grass reached 12 inches in following year.

Brink, 2018
## Grazing Height Research
### Residual Effects on Orchardgrass Grazed at 12 inches

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<td>5000</td>
</tr>
</tbody>
</table>

**Study Conclusions:**
- A residual of 3-4 inches is best for pastures with tall-growing grasses (orchardgrass, tall fescue, etc.).
Vertical Distribution of Ergot Alkaloids in the Vegetative Canopy of Tall Fescue
Canopy Height and Toxin Concentrations

- The location of toxic alkaloids may affect grazing recommendations.
- Several studies report the distribution of ergot alkaloids in morphological components of the grass, especially during reproductive development.
Canopy Height and Toxin Concentrations

Tall Fescue
The objective of this study was to determine the distribution of ergovaline and total ergot alkaloids throughout the vegetative canopy.
Canopy Study Methods

- Existing E+ hayfield located near Alton, MO
- Plots measuring 3’ x 20’
- Replicated eight times
- Sampled vegetative tall fescue
  - April before plants reached boot stage
  - October before the killing frost
  - Sampled four times between 2012 and 2014
Canopy Study Methods

• After each harvest plots were clipped to 3’
  • Plots were also clipped in late-May to remove seedheads and mid-August

• Plots were fertilized after each sampling in April and October with NH$_4$NO$_3$ at the rate of 45 lb/acre

• Soil testing was conducted annually in Oct following the autumn harvest.
Canopy Study Methods

• During sampling tall fescue was cut at soil level
• After collection tall fescue was divided into segments from the crown
• Segments were labeled as 0-2, 2-4, 4-6, or >6” from the crown of the plant
• Ergovaline and Total Ergot Alkaloids were measured
Canopy Study Results

Ergovaline

Sheep

Cattle

October 2012

\[ y = 3156 - 285.9x \]
\[ p < 0.0001 \]
\[ SE = 26.9 \]
\[ r^2 = 0.89 \]

\[ y = 369 - 7.9x \]
\[ p < 0.01 \]
\[ SE = 2.9 \]
\[ r^2 = 0.25 \]
Canopy Study Results
Ergovaline

April 2013

y = 275 - 8.1x
p < 0.001
SE = 1.7
r² = 0.43
Canopy Study Results
Ergovaline

October 2013

$y = 893 - 75.6x$
$p < 0.001$
$SE = 8.3$
$r^2 = 0.55$

$y = 155 - 1.5x$
$p < 0.60$
$SE = 2.8$
$r^2 = 0.01$

Ergovaline (ppb)

Tall Fescue Canopy Segment (inches)
Canopy Study Results
Ergovaline

April 2014

y = 374 - 17.4x
p < 0.001
SE = 3.5
r^2 = 0.44
Canopy Study Results
Total Ergot Alkaloids

<table>
<thead>
<tr>
<th>Tall Fescue Canopy Segment (inches)</th>
<th>Total Ergot Alkaloids (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>4181 - 319.1x, p &lt; 0.0005, SE = 87.1, r² = 0.18</td>
</tr>
<tr>
<td>2-4</td>
<td>1101 - 10.4x, p &lt; 0.45, SE = 3.8, r² = 0.006</td>
</tr>
<tr>
<td>4-6</td>
<td></td>
</tr>
<tr>
<td>&gt;6</td>
<td></td>
</tr>
</tbody>
</table>
Canopy Study Conclusions

• Ergovaline and total ergot alkaloid concentrations of vegetative tall fescue are highest in the base of the plant and lowest in the upper canopy.

• Cattle grazing near 2 inches can be expected to ingest high concentrations of ergovaline and total ergot alkaloids.
Canopy Study Conclusions

- Our results reinforce the importance of grazing to maintain stubble heights above 2”
  - And provide an explanation as to why overgrazing has been reported to increase the incidents of fescue toxicosis for cattle and sheep
    - Tor-Agbidye et al., 2001
- Managing the grazing height should be part of alkaloid management, a strategy proposed to limit the ingestion of toxic alkaloids
Conclusions

Overgrazing:
- Limited Stand Persistence
- Limited Yield
- Increased Toxin Concentrations
Conclusions

Overgrazing Solution:
- Shut the gates
- Sacrifice one area
- Allow other areas to REST
Conclusions
Conclusion

- Take half, leave half
The END