Pasture Management Strategies to Reduce Fescue Toxicity

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Presentation Outline
1. History and Background
2. Management of Existing Stands
3. Managing Non-Toxic Stands
4. Management

The Endophyte
- Neotyphodium coenophialum
- Fungus found in stem, leaf sheaths & seed
- Increases progressively season long
- Cannot survive outside of the plant host

Neotyphodium coenophialum
- Produces alkaloids which confer pasture pest resistance but can also cause animal health problems
  - Peramine
  - Lolines
  - Ergovaline

Other Important Alkaloids
- Medicinal Alkaloids
  - Morphine, quinine, atropine, vincristine
- Addictive Alkaloids
  - Cocaine, heroin, caffeine, nicotine
- Very toxic in small amounts
  - Strychnine, coniine

Problems with Toxic, Endophyte-Infected Tall Fescue
- Lower conception rates
- Reduced milk production
- Reduced feed intake
- Rough hair coat
- Increased core body temperature in summer (leads to heat stress)
- Frozen nose, ears, tails, etc (in winter)
- Fescue foot
Problems with Toxic, Endophyte-Infected Tall Fescue

- Lower conception rates
  
  - Males and Females Effected
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Economic Impact of Fescue Toxicosis

- US beef industry over $600 million annually
- Missouri beef industry over $160 million annually
- All US livestock sectors over $1 billion

Endophyte-Free Tall Fescue

Bouton et al., 2002

www.noble.org

Endophyte generally necessary for persistence south of this line

(Weist, 1998)

Plant-Endophyte Relationship

- Mutualistic Symbiosis
- Plant provides habitat and nutrition for the endophyte
- Endophyte (fungus) provides plant with multiple benefits
  
  - Drought Tolerance
  - Insect Resistance
  - Increase Nutrient Acquisition
  - Grazing Tolerance
  - Others

Non-Toxic Endophyte-Infected Tall Fescue

Roberts and Andrae, 2004

E+ tall fescue: infected with toxic endophyte

E- tall fescue: not infected, or “endophyte-free”

E++ tall fescue: re-infected with “beneficial” endophyte
Non-Toxic Endophyte-Infected Fescue

- Non-toxic endophytes (Novel or Friendly)
  - Retain persistent qualities
  - Animal performance similar to E-

Available Varieties:
- Jesup Tall Fescue with MaxQ
- Advance with AR37
- Bar-Optima with E34
- Texoma with MaxQII
- Estancia with ArkShield
- Martin with Protek

Test

Low  High
Keep  Replace  Manage
- E- Tall Fescue
- NTE Tall Fescue
- Other Forages
- Alkaloid Management
- Incremental Improvement
- Rotate Pastures
- Dilute
- Supplement
- Other

Animal performance similar to E-
- Animals perform better than E+

<table>
<thead>
<tr>
<th>Location</th>
<th>AR4</th>
<th>E-</th>
<th>E+</th>
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<tbody>
<tr>
<td>Fayetteville, AR</td>
<td>1.43</td>
<td>1.55</td>
<td>0.93</td>
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<tr>
<td>Mt. Vernon, MO</td>
<td>1.21</td>
<td>1.21</td>
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</table>

West et al., 1998

Manage vs. Replace

- Manage Existing Stands
  - Alkaloid Management
  - Incremental Improvement
- Replace Toxic KY31 with Improved Varieties
  - Manage for Persistence

Incremental Improvement

Roberts and Andrae, 2004
Rotate to Alternative Forage

- Moving cattle to summer pasture greatly increases animal performance
  - High temperatures can intensify the toxic effect of infected fescue
- 88 degrees F may be a threshold for significantly decreased gain.
- After moving, cattle should remain off of infected tall fescue for the entire summer

<table>
<thead>
<tr>
<th>Grazing Days</th>
<th>KY-31</th>
<th>MaxQ</th>
<th>Hi-Mag</th>
<th>Small Grains</th>
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<tbody>
<tr>
<td>ADG</td>
<td>1.11</td>
<td>1.88</td>
<td>1.87</td>
<td>2.12</td>
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<tr>
<td>Gain/Head</td>
<td>116</td>
<td>199</td>
<td>199</td>
<td>138</td>
</tr>
</tbody>
</table>

Rotation To Other Forages

- Negative returns with KY-31
- Outstanding production with NE
- Planting NE fescue in place of small grains appears to be an equally viable option for cattlemen

Dilute with Legumes

- Thompson et al. (1993) summarized data from 12 independent studies
  - Concluded that interseeding legumes into E+ pastures increased steer ADG during spring and summer grazing periods

- Replacement with nontoxic forages has greater benefit.
  - Steer ADG is lower when grazing E+ tall fescue with clover compared to E- tall fescue with clover, even in E- pastures containing no clover
- Furthermore, interseeding legumes into highly infected (>50%) E+ stands may not always dilute the effects of fescue toxicosis.
  - Highly infected stands with and without clover had similar animal performance.

Incremental Improvement

Other Strategies: 1. Limit N Fertilizer 2. Clip Seedheads
Feedlot Performance

- Cattle that previously grazed E- and E++ tall fescue entered the feedlot 117 pounds heavier and finished 108 pounds heavier than cattle that grazed E+ tall fescue.

Coffee et al. (2012) Study

- 5 Treatments
  - Spring Calving – All E+
  - Spring Calving – 75% E+ 25% NTE
  - Fall Calving – All E+
  - Fall Calving – 75% E+ 25% NTE
  - Spring Calving – All NTE
- Year-round grazing management

Calving Rates

- 100% E+ vs 25% NE+ (P < 0.05)
- NE100 vs spring NE25 (P < 0.10)

Managing NTE

- The question of persistence
  - Under normal grazing conditions, it is reasonable to expect that NTE tall fescue will survive as well as toxic E+ tall fescue and will persist much better than E- tall fescue.
  - Grazing Practices
  - Fertility
  - Hay Supplementation

Prevent Reinvassion of KY31

- Proper renovation is a must
  - Spray/Smother/Spray
  - 75% of Toxic plants are those that survive the renovation process
Prevent Reinvasion of KY31

- Minimize seed transfer in manure and hay
  - KY31 seed can be transferred in the manure or on hair/wool
  - Seed transfer is minimized in dense stands
  - Do not feed KY31 hay on NTE Stands

Things to Remember

- Diluting existing stands is possible, but takes work
  - Try to achieve less-than 50% toxin in diet
  - Legumes
  - Rotation to summer pasture
  - Grain or other supplements
- Livestock perform best on NTE
  - KY31 is hard to kill . . . do a good job removing it during the renovation
  - Rotational grazing is a must

Thank You!

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