T-Snip™
a test for tolerance to toxicosis
Disclosures

Dr. Roberts is partner with AgBotanica, LLC, a faculty start-up company that owns T-Snip™ technology and conducts for-profit genetic testing.

www.agbotanica.com

Dr. Roberts is Chair of the Alliance for Grassland Renewal, an organization whose objectives include promotion of novel endophyte technology.

www.grasslandrenewal.org
The talk today ...

1. Fescue toxicosis
2. Management
3. T-Snip test for fescue tolerance
The talk today ...

1. Fescue toxicosis
<table>
<thead>
<tr>
<th>R1</th>
<th>R2</th>
<th>Methyl</th>
<th>Ethyl</th>
<th>Isopropyl</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISOPROPYL</td>
<td>ISOPROPYL</td>
<td>ERGOVALINE</td>
<td>ERGONINE</td>
<td>ERGOCORNINE</td>
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<tr>
<td>ISOBUTYL</td>
<td>ISOBUTYL</td>
<td>ERGOSINE</td>
<td>ERGOPTINE</td>
<td>ERGOCRYPTINE</td>
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<td>ISOPHENYL</td>
<td>ERGOTAMINE</td>
<td>ERGOSTINE</td>
<td>ERGOCRISTINE</td>
</tr>
</tbody>
</table>
Health
- Vasoconstriction (narrowing of blood vessels)
- Poor thermoregulation
- Fescue foot, heat stress
- Immunosuppression

Production
- Low feed intake
- Low rate of gain
- Dystocia (birthing problems) and poor reproduction
- Aglactia (poor milk production)
<table>
<thead>
<tr>
<th></th>
<th>E+</th>
<th>E-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb/day</td>
<td>lb/day</td>
</tr>
<tr>
<td>Texas</td>
<td>0.99</td>
<td>2.14</td>
</tr>
<tr>
<td>Alabama</td>
<td>1.41</td>
<td>2.18</td>
</tr>
<tr>
<td>Georgia</td>
<td>1.02</td>
<td>1.31</td>
</tr>
<tr>
<td>Alabama</td>
<td>1.00</td>
<td>1.83</td>
</tr>
<tr>
<td>Missouri</td>
<td>0.97</td>
<td>1.41</td>
</tr>
<tr>
<td>Alabama (seed)</td>
<td>0.44</td>
<td>2.12</td>
</tr>
<tr>
<td>Alabama (hay)</td>
<td>0.62</td>
<td>1.46</td>
</tr>
</tbody>
</table>
2004 Impact to Missouri Beef Industry

Stockers:
$30 million /year

Cow-calf:
$130 million /year
The talk today ...

1. Fescue toxicosis
2. Management
Eldon Cole’s 97 Witches Brews

- Breed this
- Don’t breed this
- Feed this
- Feed that
- Spices
- Pet milk
- Chase cattle
Endophyte Test

Low
- Keep

High
- Replace
- Manage
  - Spray-Smother-Spray
  - Novel Endophytes
Alkaloid Management
Incremental Alleviation

- Spray-Smother-Spray
- Novel Endophytes

- Main Practices
  - Summer grazing
  - Pasture dilution
  - Diet supplementation

- Other Practices
  - Local cattle
  - Low N fertilization
  - Hay ammoniation
with legumes
with supplement
with rotation
grass only

Daily Gain (lb/A)

toxic

novel
Endophyte Test

- Low
  - Keep
    - Spray-Smother-Spray
    - Novel Endophytes

- High
  - Replace
  - Manage
    - Main Practices
      - Summer grazing
      - Pasture dilution
      - Diet supplementation
    - Other Practices
      - Local cattle
      - Low N fertilization
      - Hay ammoniation
Daily Gain (lb/A)

- toxic
- novel

grass only

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The talk today ...

1. Fescue toxicosis
2. Management
3. T-Snip test for fescue tolerance
T-Snip™: a genetic test for fescue tolerance
T-Snip™ Test Results

Joe Customer
111 Route BB
Your Town, MO 12345
(573) 555-5555
JoeCustomer@email.net

<table>
<thead>
<tr>
<th>Barcode</th>
<th>Animal ID</th>
<th>Tolerance Index</th>
<th>Rating</th>
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<tbody>
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<td>4</td>
<td></td>
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Relationship of Dam Star Score to Calf Adjusted Weaning Weight ($N=2,260$)

Adjusted Weaning Weight

<table>
<thead>
<tr>
<th>Star Score of Dams</th>
<th>Adjusted Weaning Weight</th>
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<tr>
<td>0</td>
<td>480</td>
</tr>
<tr>
<td>1</td>
<td>490</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>510</td>
</tr>
<tr>
<td>4</td>
<td>520</td>
</tr>
<tr>
<td>5</td>
<td>530</td>
</tr>
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</table>

$= 50$ pound difference
205-d Weaning Weight (lb)

<table>
<thead>
<tr>
<th>Non-toxic Fescue</th>
<th>Toxic Fescue</th>
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<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
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<tr>
<td>200</td>
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<tr>
<td>500</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
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</table>
41% increase in average daily gain (lb) compared to toxic Fescue.
This Relationship is Consistent Across Years

Star Score of Dams

Adjusted Weaning Weight

2011 (N=200)  2012 (N=771)  2013 (N=852)  2014 (N=309)

0  1  2  3  4  5

Star Score of Dams
This Relationship is Consistent Across Breeds*

*Breed as defined by owner; cows were not registered
What Scores Should be Selected?

Percent of Animals

<table>
<thead>
<tr>
<th>Score</th>
<th>Validation Herds</th>
<th>Commercially Genotyped</th>
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</thead>
<tbody>
<tr>
<td>0</td>
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</tr>
<tr>
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<td>10</td>
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<td>100</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>50</td>
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</tbody>
</table>
T-Snip™ Testing

T-Snip™ is a genetic test that identifies cattle with improved tolerance to fescue toxicosis. T-Snip™ has been confirmed in grazing and feeding cattle that have been identified by T-Snip™ as tolerant have had 8% higher intake, 41% higher gain, and 55 lb heavier weaning weights. For more information on toxicosis, click here.

To submit a sample for T-Snip™ testing, create an account with AgBotanica or login to your existing account.

Create Account  Login

Then follow the 5-step process below. If you do not have cards, begin with step 1 by clicking on it.

1. Order Cards
2. Print Forms
3. Collect Samples
4. Pay for Samples
5. Mail Samples
Daily Gain (lb/A)

- toxic
- toxic + T-Snip™
- novel
General Comments about T-Snip™

- Research needs: heritability, vasoconstriction, etc.
- One-time cost
- Not “resistant” but tolerant
- Allows “half recovery” (intake, gain, weaning weight)
- No set recommendation—Bulls first? Heifers first?
How can the scores be used?
(Dr. Spurlock)

1) Selection Decisions
   - Replacement Heifers
   - Bulls to sire Replacement Heifers

2) Mating Decisions
   - Mate highest scoring cows and bulls to optimal replacement heifers

3) Culling Decision
   - Information to consider when removing cows from herd
Management when Converting to Novel
Management with Novel Endophyte Fescue
T-Snip™ Testing
for
Fescue Tolerance