A Place for Native Warm-season Grasses

Tenth Eastern Native Grass Symposium
Evansville, IN
August 30, 2016

P. Keyser
Center for Native Grasslands Management
Poor Summer Forage =

- Reduced pasture quality/prodn
- Increased weed pressure
- Toxins (prussic acid, nitrates)?
- Reduced hay production
- Increased feed costs
- Reseeding/renovating pastures
- Reduced weaning weights
- Reduced calf crops
- Selling into saturated markets
- Rebuilding herds (expensive stock)
### Standard Performance Analysis

475 herds, TX/NM/OK, 1991 - 2005

<table>
<thead>
<tr>
<th>Performance by Profit Quartile</th>
<th>Top 25%</th>
<th>2nd 25%</th>
<th>3rd 25%</th>
<th>Low 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wean %</td>
<td>84.2</td>
<td>82.7</td>
<td>79.9</td>
<td>80.1</td>
</tr>
<tr>
<td>Wean Wt.</td>
<td>547</td>
<td>528</td>
<td>524</td>
<td>502</td>
</tr>
<tr>
<td>Acres per Cow</td>
<td>24.4</td>
<td>23.1</td>
<td>20.4</td>
<td>18.3</td>
</tr>
<tr>
<td>Feed Cost</td>
<td>$141</td>
<td>$158</td>
<td>$171</td>
<td>$203</td>
</tr>
<tr>
<td>Cost per c.w.t.</td>
<td>$61</td>
<td>$80</td>
<td>$96</td>
<td>$149</td>
</tr>
<tr>
<td>% ROA</td>
<td>6.6%</td>
<td>2.3%</td>
<td>-2.0%</td>
<td>-7.4%</td>
</tr>
</tbody>
</table>

Courtesy, Dr. Jason Johnson, Texas A&M Extension Ag Econ
Poor Summer Forage Production

Jan 2014 - lowest inventory since 1951!!!
Complementing Cool-season System with Warm-season Grasses =

Improved:

- drought resiliency
- calving rates/birth weights
- backgrounding/stocker gains
- heifer development
- purchased feed budgets
- opportunities for stockpiling
- condition of CSG pastures (rest)
- soil health
- enterprise profitability/viability
Exceptional Drought Tolerance

Data courtesy Dr. Don Tyler, UTIA; collected at Milan REC
Exceptional Drought Tolerance
Preliminary Data

Water-use Efficiency (CO2/H2O)

- Switch
- Eastern Gamagrass
- Indiangrass
- Big Bluestem
- Bermudagrass
Deep Roots = Healthy Soil = Green Grass
Low Input

No N for 5 years!

- \( N = 60 \text{ lb/ac} \)
- P & K only test is if “Low”
- pH > 5.0
Low Input – vs. Bermudagrass
**Low Input – vs. Tall Fescue**

<table>
<thead>
<tr>
<th>Species</th>
<th>Annual Yield (tons/ac)</th>
<th>Fertility (lb N/ac)</th>
<th>Harvests (no./year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big bluestem</td>
<td>2.6 - 6.0</td>
<td>3.9</td>
<td>60</td>
</tr>
<tr>
<td>Indiangrass</td>
<td>2.5 - 5.9</td>
<td>4.6</td>
<td>60</td>
</tr>
<tr>
<td>Eastern gamagrass</td>
<td>3.1 - 9.6</td>
<td>4.9</td>
<td>60</td>
</tr>
<tr>
<td>Switchgrass (Alamo)</td>
<td>2.0 - 11.6</td>
<td>5.2</td>
<td>60</td>
</tr>
<tr>
<td>Tall fescue (KY31)</td>
<td>2.1 - 4.8</td>
<td>3.1</td>
<td>180</td>
</tr>
</tbody>
</table>
Cost of Hay Production

Production Costs for Four Common Mid-South Hay Crops

- NWSG
- Bermudagrass
- Sudex
- Tall Fescue

<table>
<thead>
<tr>
<th>Hay Yield (tons/acre)</th>
<th>Total Budget Cost ($/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$123</td>
</tr>
<tr>
<td>3</td>
<td>$83</td>
</tr>
<tr>
<td>4</td>
<td>$53</td>
</tr>
<tr>
<td>5.5</td>
<td>$75</td>
</tr>
</tbody>
</table>
So, NWSG:

- Provide excellent drought tolerance
- Require low inputs
- Enhance soil health (huge root systems = C!)
- Produce inexpensive forage

But... what about animal performance, do cattle do well on them?
## Animal Performance (Steers)

<table>
<thead>
<tr>
<th>Forage</th>
<th>ADG</th>
<th>AUD</th>
<th>Gain/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchgrass</td>
<td>1.74</td>
<td>172</td>
<td>435</td>
</tr>
<tr>
<td>Big blue/Indian</td>
<td>2.11</td>
<td>121</td>
<td>369</td>
</tr>
</tbody>
</table>

71 – 115 days grazing per year
weaned, market steers (600 lb starting weight)
# Gains Sustained 90+ Days

<table>
<thead>
<tr>
<th>Forage</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchgrass</td>
<td>2.83</td>
<td>1.92</td>
<td>1.48</td>
<td>0.75</td>
</tr>
<tr>
<td>Big blue/Indian</td>
<td>2.83</td>
<td>2.57</td>
<td>1.76</td>
<td>0.87</td>
</tr>
</tbody>
</table>

- excellent tool for backgrounding/stockering steers, and grass-finished operations
Economics of Grazing Beef Steers

<table>
<thead>
<tr>
<th>NWSG†</th>
<th>Beef Yield</th>
<th>Net Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West TN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG</td>
<td>229&lt;sup&gt;a&lt;/sup&gt;</td>
<td>$104&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>BBIG</td>
<td>266&lt;sup&gt;a&lt;/sup&gt;</td>
<td>$136&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>EG</td>
<td>248&lt;sup&gt;a&lt;/sup&gt;</td>
<td>$99&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Middle TN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SG</td>
<td>436&lt;sup&gt;c&lt;/sup&gt;</td>
<td>$345&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>BBIG</td>
<td>370&lt;sup&gt;b&lt;/sup&gt;</td>
<td>$257&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

† BBIG=Big Bluestem and Indiangrass; SG=Switchgrass; EG=Eastern Gamagrass

<sup>a,b</sup>If letter is the same across treatment and location, then means are not different (p = 0.05).

Lowe et al. 2015. Agronomy Journal 107:1733–1740
# Bred Heifer Performance

Middle Tennessee REC, 2010-2011; 1,050# Holstein heifers

East Tennessee REC, 2010-2012; 967# Angus heifers

<table>
<thead>
<tr>
<th>Forage</th>
<th>ADG</th>
<th>Total gain/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB/IG</td>
<td>1.78</td>
<td>203</td>
</tr>
<tr>
<td>SG</td>
<td>1.45</td>
<td>180</td>
</tr>
<tr>
<td>EG</td>
<td>1.15*</td>
<td>205</td>
</tr>
</tbody>
</table>

* Equivalent to 1.35 lb/day, steer basis
Cost of Gain ($ per lb) for Grazing Heifers

Heifer development =
most expensive aspect of beef (or dairy) production
- mostly feed cost (75%) for 30+ months w/o any return!

**Eastern Gamagrass vs. Sudex**

- **Perennials:**
  - always available
  - no decision on whether to plant annual
  - or when to plant it
  - no annual estab risk
  - no prussic acid/nitrates
  - more grazing days

<table>
<thead>
<tr>
<th></th>
<th>ADG</th>
<th>Days</th>
<th>Beef/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gama</td>
<td>1.15</td>
<td>192</td>
<td>205</td>
</tr>
<tr>
<td>Sudex</td>
<td>1.63</td>
<td>81</td>
<td>129</td>
</tr>
</tbody>
</table>

No N applied on pastures for 5 years!
So, NWSG:

- Provide excellent drought tolerance
- Require low inputs
- Contribute to soil health
- Produce inexpensive forage
- Produce good animal performance (steers and heifers)
- Provide advantages over annuals

But... aren’t they difficult to manage?
Grazing Management: Intensity

- Management Intensive Grazing (1 – 6 hours)
- Rotational Grazing (intensive: 1 – 3 days)
- Rotational Grazing (simple: 1 – 3 weeks)
- Heavy Early Stocking
- Continuous Grazing
Heavy Early vs. Continuous Stocking

Stocking (lb/ac live animals)

May 1

Aug 29

Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Week 13
Week 14
Week 15
Week 16
Week 17
Week 18

Actual
Heavy Early vs. Continuous Stocking

Stocking (lb/ac live animals)

May 1

Aug 29

Actual

1.0 (913#/ac)
Heavy Early vs. Continuous Stocking

Stocking (lb/ac live animals)

May 1 - Aug 29

- Actual
- 1.25X - 0.75X
- 1.0 (913#/ac)
### Preliminary Animal Performance – Beef

<table>
<thead>
<tr>
<th>Grazing Strategy</th>
<th>ADG (lb/day)</th>
<th>Steer Days/ac</th>
<th>Beef/ac (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>2.05</td>
<td>138</td>
<td>283</td>
</tr>
<tr>
<td>Heavy Early</td>
<td>2.07</td>
<td>135</td>
<td>275</td>
</tr>
</tbody>
</table>

* O N/ac applied since at least 2011

- 220-250 lb/head over summer season (112 days)
Flexibility: Timing Forage Availability...

June 20

August 13
Resiliency

No N applied for 6+ years
So, NWSG:

- Provide excellent drought tolerance
- Require low inputs
- Contribute to soil health
- Produce inexpensive forage
- Produce good animal performance (steers and heifers)
- Provide advantages over annuals
- Aren’t difficult to manage

But... are extremely difficult to establish, right?
Establishment

Planted April 20, 2012,
10 PLS lb/ac BB (6)/IG(3)/LB(1)
picture taken Sept 28, 2012
Grassland Birds: Severe Declines!!

Dickcissel -39%

Eastern Meadowlark -68%

Field Grasshopper -70%

Bachman’s -80%

Henslow’s -96%

BBS 1966 - 2006
Improved Cover...

Winter

NWSG

Summer

Fescue
Natural Disturbance in Grasslands

• essential to healthy grasslands
• especially where rainfall is >35”
• fire is important, but grazing may be critical
Dry Tons
- zero
- up to 500 thousand
- up to 1 million
- up to 2 million
- up to 4 million
- over 4 million

Footprint of 377 MM dt of Grass Production

➢ 35 - 55 MM ac by 2025

English et al. 2006 (http://www.agpolicy.org/ppap/)
Grassland Birds

Hayed, grazed, seed production, biofuels, and controls KY & TN

* no difference in occupancy for EAME, GRSP, NOBO, or RWBL

Grassland Bird Use of NWSG Production Fields, 2009 - 2010

West et al. 2016 JWM in press
Native grasses, which are drought-tolerant, low input perennials that enhance soil health and provide:

- high stocking (1,000 – 2,500 lb/ac)
- strong gains (>2.0 lb/day)
- very good total production (350 – 450 lb/ac)
Native grasses can make important contributions to profitable grazing through:

- stockering
- backgrounding calves
- heifer development
- providing “drought insurance” for cow-calf operations
- improved calving rates/weights (toxicosis issues)???
Native grasses can be managed with a good deal of flexibility and are resilient to mis-management with some care.

Natives can provide excellent habitat for at-risk wildlife – ESPECIALLY – with proper grazing.