Economic Viability and Agro-ecology of Integrating Beef Cattle and Short Term Perennial Grasses into Peanut and Cotton Rotations

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United States Department of Agriculture

National Institute of Food and Agriculture
Overall objective

To evaluate the ecological, environmental and socioeconomic impacts of integrating beef cattle and perennial grass into a multi-crop production system using conservation technology and other best management practices in the Southeast USA with emphasis on small- to medium-sized farms.
North Florida Research and Education Center

Wiregrass Research and Extension Center

N
PEANUT

BAHIA 2

PEANUT

BAHIA 1

COTTON

COTTON

N

Peanut/cotton rotation

Cage (Un-grazed Plots); Grazed Plots

North Florida Research and Education Center

Wiregrass Research and Extension Center

N

Cage (Un-grazed Plots); Grazed Plots

North Florida Research and Education Center

Wiregrass Research and Extension Center

N

Cage (Un-grazed Plots); Grazed Plots
1) Demonstrate that the integration of beef cattle (cow-calf system) into a sod-based peanut and cotton rotation cropping system (SBR) is an economically viable and environmentally sound alternative to a SBR system in which the perennial grass is harvested and sold as hay only.
### Objective 1 outcomes

Economic analysis of SBR system: 13 ha of cotton, 13 ha of peanuts, and 64 brood cows

<table>
<thead>
<tr>
<th>Return over Variable Costs</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>$16,347.69</td>
</tr>
<tr>
<td>Peanuts</td>
<td>$16,687.12</td>
</tr>
<tr>
<td>Cattle</td>
<td>$11,170.40</td>
</tr>
<tr>
<td><strong>Total Return over Variable Costs</strong></td>
<td><strong>$44,205.21</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Fixed Costs</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery and equipment</td>
<td>$9,447.53</td>
</tr>
<tr>
<td>Cow/calf</td>
<td>$14,710.49</td>
</tr>
<tr>
<td>Irrigation</td>
<td>$13,510.00</td>
</tr>
<tr>
<td><strong>Total Annual Fixed Costs</strong></td>
<td><strong>$37,668.02</strong></td>
</tr>
</tbody>
</table>

**Returns Over Total Costs (Net Farm Income)** $6,537.20
Specific objectives

2) Identify and quantify the impacts of cattle grazing and traffic in a SBR system on subsequent crop growth, yield and quality, and on soil compaction, C level, nutrient (N and P) utilization and cycling, and greenhouse gas emissions ($N_2O$, $CO_2$, $CH_4$).
Objective 2 outcomes

Seasonal CO₂ Flux

- CO₂ Flux (kg CO₂-C ha⁻¹ d⁻¹)
- Winter, Spring, Summer, Fall
- Bahia1, Bahia2, Cotton, Peanut

CO₂ Flux_Grazing

- CO₂ Flux (kg CO₂-C ha⁻¹ d⁻¹)
- Grazed, Nongrazed

N₂O Flux_Grazing

- N₂O Flux (g N₂O-N ha⁻¹ d⁻¹)
- Grazed, Nongrazed
Objective 2 outcomes

- Cattle CH$_4$ emissions measured using the SF$_6$ tracer technique
- Data will be integrated with soil gas flux to conduct a GHG emissions balance in the SBR system.
### Specific objectives

3) Identify producers’ concerns, constraints and obstacles to adopting a SBR system via face-to-face interviews with members of key advisory committees, participant observation at associated outreach activities, and interviews and on-farm observations with two producers who have newly established SBR systems with cattle. Results will be used to modify the SBR approach.

<table>
<thead>
<tr>
<th>Activity</th>
<th># of Unique Events</th>
<th># of Unique Sessions</th>
<th># of Subjects Included</th>
<th>Hours of Recording</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Observation at Workshops &amp; Field Days</td>
<td>4</td>
<td>18</td>
<td>~200-250</td>
<td>10+</td>
<td>Complete</td>
</tr>
<tr>
<td>Interviews with Producers with Some Form of a Sod Rotation (Not as endorsed)</td>
<td>---</td>
<td>9</td>
<td>7</td>
<td>4.5+</td>
<td>Ongoing (5-10 more subjects)</td>
</tr>
<tr>
<td>Interviews with Sod-Based Rotation with Cattle Personnel</td>
<td>---</td>
<td>28</td>
<td>28</td>
<td>14+</td>
<td>Complete</td>
</tr>
</tbody>
</table>
4) Develop a profit/loss business model using actual economic data collected from our small- to medium-size farm-scale demonstration sites integrating beef cattle into a SBR cropping system.

http://nfrec.ifas.ufl.edu/
Overall outcomes

Grad students / postdocs
• Dr. M. Ruiz Moreno
• Dr. G. Anguelov
• Dr. S. George
• M. Quintero (PhD student)
• J. Huntrods (MS student)
• C. Prevatt (MS student)
• Audrey Gamble (MS student)
• A. Cook (MS student)
• R. Prevatt, III (MS student)

Publications
• 2 In Press peer reviewed papers
• 7 Conference proceedings abstracts
• 3 Extension publications
• 4 Popular press articles
• 11 Presentations

Field days (attendance)
• 6/21/12 – SBR Field Day, Marianna, FL (68)
• 4/5/12 – Cattle Field Day, Headland, AL (60)
• 10/28/11 - Beef/Forage Field Days, Marianna, FL (103)
• 8/23/12 - Young Cattlemen Field Day (20)
Questions