Effects of Continuous and Strip Grazing of Corn Residues on Cow Performance and Soil Properties

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Introduction

In the Midwest, the most expensive element of a cow/calf operation is the production or purchase of winter feed sources. These costs serve as a powerful incentive to utilize corn residue as a fall and/or winter grazing alternative opposed to drylot feeding. In areas where corn production excels, residue left from grain harvest is often unused or incorporated into the soil. Corn stover yield typically equals that of grain yield, offering an abundance of forage that can be effectively used by dry, spring calving beef cows for maintenance, while nutritional requirements are low. For integrated corn and beef operations, grazing corn stover is well documented to be a valuable resource for the beef enterprise. However, little knowledge has been presented on how grazing these corn fields after harvest can affect the soil and subsequent grain crops in the following growing seasons. Research is needed to better quantify soil and crop conditions post grazing to better understand the most profitable equation for the entire integrated system.

Materials & Methods

Thirty-six Angus cows were utilized in the fall of 2012 at the Dudley Smith Farm near Pana, IL. These cows grazed corn residue for 6 weeks in either a continuous or strip grazing system at a stocking rate of 1.2 cows/acre. Grazing treatments were compared to one another, as well as to the ungrazed control treatment. Three replications for each treatment were used in a split plot randomized complete block design illustrated below (Figure 1).

Cows had an initial mean body weight of 1426 lbs. (BCS 5.8) and were fed 4 lbs/hd/d of pelleted corn gluten feed (CGF) and pelleted soybean hulls (SBH). Cows grazing continuous treatments were allowed access to the entire paddock for 6 weeks. Cows grazing strip treatments were allowed access to only the first 1/3 on the paddock for the first 2 weeks. After that time, an electric fence was moved to allow access to the first 2/3 of the paddock. For the last 2 weeks, all temporary fences were removed, allowing the cattle to access the entire paddock. Soil samples were collected before and after the 6 week grazing season to a depth of 50 cm (20 inches). Compaction measurements were recorded before and after grazing using a penetrometer. Each core sample was then cut to obtain five 10 cm subsamples. Each subsample was then analyzed for bulk density, NO3, NH4, and available P.

Results

Cows grazing stover in a strip system gained an average of 101 lbs. vs. 61 lbs. gained by continuous grazed cows. Grazed paddocks (strip and continuous) had a significant increase in compaction and soil bulk density in the top 10 cm when compared to the ungrazed control paddocks. However, only continuous grazed paddocks had significant increases in compaction at greater depths. No significant differences in available P, NO3, and NH4 were found between treatments. The variability in these soil nutrients is
extremely high, likely preventing us from finding a significant difference due to grazing, is existent. The increase in bulk density and compaction, although significant, are not yet of agronomic importance, as ranges are still within optimal values for crop production on silt loam soils.

**Implications**

- Grazing corn residue can be a cheap grazing option for spring calving cowherds ($0.35-0.60/hd/d)
  - When supplemented cows can gain weight when consuming this low quality feedstuff, if at low nutritional requirements (post weaning/lactation)
  - Strip grazing corn residue can increase cow performance, decrease forage selectivity, and increase forage utilization, but at the cost of an increase in fencing supplies and management

- Cows will increase compaction and bulk density of the topsoil by trafficking; however these increases have not been found to be of agronomic importance, and can be removed by winter freezing or by tillage

- After one season of grazing, compacted soils were still at optimal levels of penetration resistance and bulk density for crop production, and did not affect population stands of the following corn crop

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Figure 1. Experimental layout representing 3 repetitions for each grazing method; strip, continuous, and ungrazed.

Figure 2. Statistical Analysis of Cow Performance grazing either continuous or strip grazed corn residue.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Item</th>
<th>Continuous</th>
<th>Strip Grazed</th>
<th>SE</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial BW, lbs.</td>
<td>1428</td>
<td>1425</td>
<td>3.7</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td>Initial BCS</td>
<td>5.8</td>
<td>5.9</td>
<td>0.7</td>
<td>0.73</td>
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</tr>
<tr>
<td>Final BW, lbs.</td>
<td>1489</td>
<td>1526</td>
<td>13.1</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Final BCS</td>
<td>5.6</td>
<td>5.8</td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW Change, lbs</td>
<td>61</td>
<td>101</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>