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Use of Dry-rolled Corn, Dry or Wet Distillers Grains Plus Solubles as an Energy Source in High Forage Diets for Growing Cattle

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Use of Dry-rolled Corn, Dry or Wet Distillers Grains Plus Solubles as an Energy Source in High Forage Diets for Growing Cattle

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Summary

One hundred twenty crossbred steers were used to determine the energy value of distillers grains relative to corn in high-forage diets. Diets included dry distillers grains plus solubles (DDGS), wet distillers grains plus solubles (WDGS) or dry-rolled corn (DRC), with sorghum silage, grass hay, and supplement. Each block of steers, by design, had similar dry matter intake (DMI) and average daily gain (ADG) across treatments. In this study, WDGS and DDGS contained 120% and 114%, respectively, the energy of DRC when fed in forage-based diets.

Introduction

Past research has shown that in forage-based diets, feeding starch as an energy source can suppress forage digestion. Using dry distillers grains plus solubles (DDGS) or wet distillers grains plus solubles (WDGS) in place of dry-rolled corn (DRC) can reduce the negative associative effects that starch can have on fiber digestion. In forage-based diets, DDGS and WDGS have been shown to contain 118% to 130% (2003 Nebraska Beef Report, pp. 8-10) and 130% (2009 Nebraska Beef Cattle Report, pp. 28-29), respectively, of the energy of DRC when fed in forage-based diets.

Procedure

Cattle Performance

One hundred twenty crossbred steers in two weight blocks (543 ± 22 lb) were used in an 84-day growing trial to compare the energy value of DDGS and WDGS, at differing levels, to DRC in a forage-based diet. Calves were blocked into two weight groups, stratified within block and assigned randomly to one of seven diets. Animals were randomly paired into groups of three based on BW and assigned to one of seven diets. Animals were blocked into two weight groups, stratified within block and assigned randomly to one of seven diets. Animals were randomly paired into groups of three based on BW and fed either the low or high levels of each diet: 1) DRC, 2) DDGS, or 3) WDGS. Prior to initial and ending BW, steers were limit fed a common diet, containing 60.0% Sweet Bran®, 20.0% grass hay, and 20.0% alfalfa to reduce variation in gut fill. Weights were obtained three consecutive days following each limit-feeding period.

Diet compositions

Diet Treatment 1

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Control</th>
<th>DRC</th>
<th>DDGS</th>
<th>WDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass hay</td>
<td>56.52</td>
<td>43.08</td>
<td>26.26</td>
<td>49.5</td>
</tr>
<tr>
<td>Sorghum silage</td>
<td>37.68</td>
<td>28.72</td>
<td>17.44</td>
<td>33.0</td>
</tr>
<tr>
<td>DRC</td>
<td>—</td>
<td>22.0</td>
<td>50.0</td>
<td>—</td>
</tr>
<tr>
<td>DDGS</td>
<td>—</td>
<td>—</td>
<td>15.0</td>
<td>30.0</td>
</tr>
<tr>
<td>WDGS</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>15.0</td>
</tr>
<tr>
<td>Urea</td>
<td>0.65</td>
<td>1.05</td>
<td>1.51</td>
<td>1.13</td>
</tr>
<tr>
<td>Soypass</td>
<td>3.80</td>
<td>3.70</td>
<td>3.45</td>
<td>—</td>
</tr>
<tr>
<td>Limestone</td>
<td>0.82</td>
<td>0.943</td>
<td>0.943</td>
<td>0.943</td>
</tr>
<tr>
<td>Salt</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Trace mineral premix</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Vitamin ADE premix</td>
<td>0.015</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Tallow</td>
<td>0.141</td>
<td>0.151</td>
<td>0.157</td>
<td>0.061</td>
</tr>
</tbody>
</table>

1 Represented as a percentage of diet DM.
The NRC (1996) model predicts gain using DMI and dietary energy content. Therefore, energy content of the feed can be predicted if gain and DMI are known. Intake, diet composition, BW, and ADG were used to calculate the energy value of WDGS and DDGS in the treatment diets. The TDN of DRC utilized for this experiment had been determined in a similar manner at 83% (2003 Nebraska Beef Cattle Report, pp. 8-10), thus results for DDGS and WDGS could be expressed relative to corn.

Data were analyzed using the MIXED procedure of SAS with alpha = 0.10. The model included the level of byproduct inclusion and type of feed. Animal was considered the experimental unit (18 head/treatment) for cattle performance.

### Results

#### Cattle Performance

There were no interactions between level of supplement inclusion (low or high) and type of feed (DRC, DDGS, or WDGS). By design, type of feed (DRC, DDGS, or WDGS) did not impact initial BW, ending BW, DMI, ADG, or F:G (Table 2). The main effect of level of inclusion is shown in Table 3. Ending BW and ADG increased linearly as the level of energy increased in the diets, while F:G linearly decreased (P < 0.01). This linear improvement was expected as the amount of grain or byproduct included increased, so did the level of energy. Intake was not different between levels (P = 0.64).

The TDN value for corn was set at 83% (2003 Nebraska Beef Report, pp. 8-10), 52% for hay, and 65% for sorghum silage. Using the NRC (1996) to calculate TDN, net energy (NE) adjusters were set at 104.5%. The resulting TDN value of DDGS and WDGS was 94.5% and 99.2%, respectively. Therefore, the estimated energy value of DDGS and WDGS was 114% and 120% the value of corn (94.5 ÷ 83 and 99.2 ÷ 83).

This trial reiterates that distillers grains (dry or wet) have a high energy value relative to corn in forage-based diets. The level of starch present at low amounts, the energy density of fat, undegradable protein and corn fiber are the possible reasons contributing to greater energy value compared to corn as a supplement.

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