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Comparative value of dry-rolled corn, distiller’s dried grains, and wheat middlings for receiving diets

Abstract
Two 28-day receiving experiments were conducted using 620 exotic x British cross steers to evaluate differences in growth performance, morbidity, and mortality when fed diets containing dry-rolled corn, distiller’s dried grains with solubles, or wheat middlings. All diets contained approximately 60% concentrate and 40% roughage (alfalfa hay). Gain and efficiency tended to be poorer for cattle fed the wheat middling-based diet than for those fed corn. No notable differences were evident in terms of the percentage of cattle treated for respiratory disease. Feed intake and daily gain were improved slightly when corn was replaced by distiller’s dried grains, but efficiency was not changed. However, the incidence of respiratory disease also was higher for cattle fed the distiller’s grains diet in comparison to corn.

Keywords
Cattlemen's Day, 1999; Kansas Agricultural Experiment Station contribution; no. 99-339-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 831; Beef; Distiller’s grains; Wheat middlings; Receiving cattle; Health

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COMPARATIVE VALUE OF DRY-ROLLED CORN,
DISTILLER'S DRIED GRAINS, AND WHEAT
MIDDINGS FOR RECEIVING DIETS

J. S. Drouillard, S. E. Ives,
D. W. Anderson, and R. H. Wessels

Summary

Two 28-day receiving experiments were
conducted using 620 exotic × British cross
steers to evaluate differences in growth perfor-
mance, morbidity, and mortality when fed diets
containing dry-rolled corn, distiller's dried grains
with solubles, or wheat middlings. All diets
contained approximately 60% concentrate and
40% roughage (alfalfa hay). Gain and efficiency
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middling-based diet than for those fed corn. No
notable differences were evident in terms of the
percentage of cattle treated for respiratory
disease. Feed intake and daily gain were im-
proved slightly when corn was replaced by
distiller's dried grains, but efficiency was not
changed. However, the incidence of respiratory
disease also was higher for cattle fed the dis-
tiller's grains diet in comparison to corn.

(Key Words: Distiller’s Grains, Wheat Middl-
ings, Receiving Cattle, Health.)

Introduction

Typically, feed intake of stressed feeder
calves is low and extremely variable following
transportation and introduction into the feedlot.
Adequate energy intake may be key to mounting
an effective immune response. However, when
intake is excessive, cattle may experience diges-
tive disturbances that further challenge their
ability to cope with the stresses of weaning,
commingling and transportation. Diets with a high
proportion of rapidly fermentable grains may
predispose animals to digestive disturbances.
By-product feeds such as wheat middlings and
distiller’s dried grains with solubles are good
sources of energy but are higher in fiber than
feed grains. These by-products are digested
more slowly than feed grains such as corn or
grain sorghum and theoretically would be less
likely to cause digestive disturbances when
eaten too rapidly or in excess quantity. Conse-
quently, we designed these studies to compare
performance of stressed feeders fed receiving
diets based on rolled corn, wheat middlings, or
distiller’s dried grains with solubles.

Experimental Procedures

Six hundred twenty weaned steer calves
were used in two receiving experiments to
evaluate growth performance, morbidity, and
mortality when fed either a standard corn-based
diet or diets based on distiller’s dried grains or
wheat middlings. Calves were purchased from
sale barns in Ohio and Indiana and transported
to the KSU Beef Cattle Research Center in
Manhattan. Calves were placed into a large pen
on arrival, given free access to long-stem prairie
hay and water, and processed within 24 hours
of arrival. Weight and temperature were re-
corded, and steers were administered Bovi-
shield®-IV, Fortess®-7, injectable Ivomec®, and
a Synovex®-S implant. Additionally, steers
were given a metaphylactic dose of Micotil® at
1.5 ml per 100 lb body weight. Calves were
allotted randomly to their respective treatments
in each study and placed into pens ranging from
22 to 32 head each. A second dose of
Bovishield®-IV was given 12 to 14 days after
initial processing. Diets are shown in Table 1.
Steers were fed their respective diets once daily.

Animals that exhibited clinical signs of
respiratory disease were identified each morning.
as candidates for treatment. They were treated for respiratory disease if clinical signs were accompanied by a rectal temperature of $103.5^\circ\text{F}$, or if they exhibited clinical signs for 2 consecutive days. The initial respiratory disease treatment was a subcutaneous injection of Micotil® at 1.5 ml per 100 lb body weight. Steers were returned to their original pen following treatment. Where necessary, calves were retreated after 48 hours, regardless of rectal temperature. The third-time treatment was a combination of 6 ml/cwt Biomycin® 200 and 5 ml/cwt Tylan® 200, administered intramuscularly.

Calves were weighed at the end of the 28-day receiving trials. Average daily gains and efficiencies were computed using the initial weight at processing and the final weight, both of which were measured approximately 24 hours after feeding.

**Results and Discussion**

Performance during the 28-day receiving experiments is summarized in Table 2. Feed intake, treatment rate, and retreatment rate were not different for calves fed the corn-based diet in comparison to those fed the middling-based diet in trial 1. Cattle fed the corn tended ($P=0.20$) to gain more rapidly and were more efficient ($P=0.09$).

In trial 2, feed intake was greater ($P=0.05$) for cattle fed the distiller’s grains diet than for those fed corn. Gain also was marginally higher for cattle fed the distiller’s grains diet, but efficiency was not different for cattle fed the two diets. Contrary to our expectations, both treatment and retreatment rates were higher ($P=0.09$) for cattle fed the distiller’s grains diet.

These studies indicate that grain by-products are reasonable substitutes for grain in receiving cattle diets. However, the incidence of respiratory disease apparently is not reduced when grain is replaced by low-starch by-products.

<table>
<thead>
<tr>
<th>Ingredient, %</th>
<th>Dry-Rolled Corn</th>
<th>Distiller’s Dried Grains with Solubles</th>
<th>Wheat Middlings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry-rolled corn</td>
<td>51.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distiller’s dried grains with solubles</td>
<td></td>
<td>53.36</td>
<td></td>
</tr>
<tr>
<td>Wheat middlings</td>
<td></td>
<td></td>
<td>52.73</td>
</tr>
<tr>
<td>Ground alfalfa hay</td>
<td></td>
<td>40.15</td>
<td>40</td>
</tr>
<tr>
<td>Cane molasses</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Dehulled soybean meal</td>
<td>1.43</td>
<td>.74</td>
<td>1.67</td>
</tr>
<tr>
<td>Limestone</td>
<td>.51</td>
<td>.74</td>
<td>1.67</td>
</tr>
<tr>
<td>Urea</td>
<td>.37</td>
<td>.30</td>
<td>.60</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>.32</td>
<td>.60</td>
<td>.60</td>
</tr>
<tr>
<td>Mineral-vitamin premix¹</td>
<td>.60</td>
<td>.60</td>
<td>.60</td>
</tr>
<tr>
<td>Crude protein, actual %</td>
<td>13.48</td>
<td>16.83</td>
<td>20.47</td>
</tr>
<tr>
<td>Calculated NEg, Mcal/100 lb</td>
<td>49</td>
<td>51</td>
<td>39</td>
</tr>
</tbody>
</table>

¹Formulated to provide .35% salt, 2:1 Ca:P; 1.5 IU/lb vitamin A, 20 IU/lb vitamin E, .04 ppm cobalt, 8 ppm copper, .5 ppm iodine, 50 ppm manganese, .3 ppm selenium, 50 ppm zinc, and 25 grams per ton Rumensin® on a dry matter basis.
Table 2. Performance of Feeder Steers Fed Receiving Diets Containing Corn, Distiller’s Dried Grains with Solubles, or Wheat Middlings

<table>
<thead>
<tr>
<th>Item</th>
<th>Dry-Rolled Corn</th>
<th>Distiller’s Dried Grains with Solubles</th>
<th>Wheat Middlings</th>
<th>SEM</th>
<th>P=</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. pens (head)</td>
<td>6 (155)</td>
<td>6 (136)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry matter intake, lb/day</td>
<td>11.4</td>
<td>11.5</td>
<td>.3</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>Daily gain, lb</td>
<td>2.64</td>
<td>2.33</td>
<td>.16</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>4.38</td>
<td>5.00</td>
<td>.23</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Pulls, %</td>
<td>13.8</td>
<td>18.1</td>
<td>4.1</td>
<td>.48</td>
<td></td>
</tr>
<tr>
<td>Repulls, %</td>
<td>3.6</td>
<td>2.2</td>
<td>1.7</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td>Trial 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. pens (head)</td>
<td>7 (186)</td>
<td>7 (187)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry matter intake, lb/day</td>
<td>11.0</td>
<td>11.9</td>
<td>.3</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>Daily gain, lb</td>
<td>2.36</td>
<td>2.72</td>
<td>.15</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>4.73</td>
<td>4.48</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulls, %</td>
<td>14.8</td>
<td>26.7</td>
<td>4.5</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Repulls, %</td>
<td>3.1</td>
<td>8.7</td>
<td>2.1</td>
<td>.09</td>
<td></td>
</tr>
</tbody>
</table>