Feeding Corn Processing Co-Products on Beef Product Quality

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Iowa State University
Presentation

Review and analyze data from cattle feeding experiments conducted at Iowa State University
  • Four experiments – DGS
  • Two experiments – CGF
  • One experiment – DGS fed to Holstein steers

Data analyzed
  • Calculated data for each animal – analyzed pen means
    a. Marbling scores
    b. Percent USDA Choice
    c. Sensory evaluation of strip loins from three experiments
    d. Carcass value ($) in a grid market

Discussion of results
Beef Cattle Fed Wet Distillers Grains

Experiments
- Four studies have been conducted (3 - steers, 1 - heifers)
- Fed 0, 16, 20 or 28, and 40% wet DGS (replaced corn and protein)
- Four to six replications (6 animals/pen)
- All yearling cattle (690 – 910 lbs) fed 112 to 186 days
- Implanted with Component E-S, TE-S/TE-H
- Diet: Dry whole or rolled corn, roughage source varied

Carcass
- Marbling and grades called after 24 or 48 hr chill by USDA graders
- Measurements by ISU personnel

Sensory Evaluation
- Conducted at ISU Meat Laboratory
- Strip loin steaks from each pen of one experiment were evaluated
  1= dislike extremely - - 9 = like extremely
Beef Steers Fed Wet Corn Gluten Feed

Experiments
• Two studies were included in the analysis
• Fed 0, 30 or 40, 50 or 65, and 90% wet CGF (replaced corn and roughage)
• Four to five replications (5 or 6 animals/pen)
• All steers (680 – 780 lbs) fed 108 to 215 days
• Implanted with Compudose
• Diet: Dry rolled corn, roughage source corn silage or ground cobs

Carcass
• Marbling and grades called after 24 or 48 hr chill by USDA graders
• Measurements by ISU personnel

Sensory Evaluation
• Conducted at ISU Meat Laboratory
• Strip loin steaks from each pen of one experiment were evaluated
  1= dislike extremely - - 9 = like extremely
Holstein Steers Fed Wet and Dry Distillers Grains

Experiment
• Fed 0, 10, 20 or 40% of diet DM as wet or dry DGS (replace corn and protein supplement)
• Four replications (6 steers/pen)
• Beginning weight 430 lbs, fed 299 days
• Implanted with Component ES on days 32, 119 and 224
• Diet: Dry rolled corn, 10% corn silage and 3% chopped grass hay

Carcass
• Marbling and grades called after 48 hr chill by plant personnel
• Measurements by ISU personnel

Sensory Evaluation
• Conducted at University of MN
• Four strip loin steaks from each pen were evaluated
  1= dislike extremely - - 9 = like extremely

Details of MN study:
http://www.iowacorn.org/forms/UMstudy_finalreport.pdf
R. Gill, D.L. Roeber and A. DiCostanzo
## Effects of Feeding Wet Distillers Grains on Carcass Measurements – Steers and Heifers

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
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<tr>
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<td>REA, sq in</td>
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<td>2.20</td>
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<tr>
<td>Calculated YG</td>
<td>2.52</td>
<td>2.58</td>
<td>2.45</td>
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</table>

AOV: ADG P < 0.04, Dress % P < 0.05

Bonferroni t-test: No significance
Effects of Feeding Wet Distillers Grains on Marbling Score and Percent Choice – Steers and Heifers

Analysis of Variance

Marbling
Control vs. Medium
Control vs. High
Medium vs. High

% Choice
Control vs. Medium
Control vs. High
Medium vs. High

Linear Regression
Marbling score
% Choice

P < 0.05
P < 0.075
P < 0.01

62 pens of yearling cattle fed 112 to 186 days
Fed control (0), medium (20 or 28), and high (40%) wet DGS
**Effects of Feeding Wet Distillers Grains on Carcass Measurements – Steers**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
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<tbody>
<tr>
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<td>Daily gain, lbs</td>
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<td>818</td>
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<td>REA, sq in</td>
<td>14.0</td>
<td>14.3</td>
<td>14.2</td>
</tr>
<tr>
<td>Backfat, in</td>
<td>.44</td>
<td>.46</td>
<td>0.40</td>
</tr>
<tr>
<td>KHP, %</td>
<td>2.1</td>
<td>2.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Call YG</td>
<td>2.22</td>
<td>2.34</td>
<td>2.08</td>
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<td>Calculated YG</td>
<td>2.65</td>
<td>2.70</td>
<td>2.52</td>
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AOV: ADG P < 0.04, Call YG P < 0.04  
Bonnferroni t-test: Call YG medium vs. high (P < 0.05)
Effects of Feeding Wet Distillers Grains on Marbling Score and Percent Choice – Steers

Analysis of Variance

Marbling
Control vs. Medium
Control vs. High *
Medium vs. High *

% Choice
Control vs. Medium
Control vs. High *
Medium vs. High *

Linear Regression
Marbling score  P < 0.09
% Choice  P < 0.01

48 pens of yearling cattle fed 112 to 186 days
Fed control (0), medium (20 or 28), and high (40%) wet DGS
Marbling Scores and Percent USDA Choice
Individual Experiments

- Steers 137 d No Sig
- Steers 113 d 0 vs. 40 P < 0.05
- Heifers 112 d No Sig
- Steers 186 d No Sig
Effects of Feeding Wet Distillers Grains on Carcass Measurements – Beef Steers for Sensory Evaluation

<table>
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<td>Daily gain, lbs</td>
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<td>813</td>
<td>791</td>
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<td>Dressing %</td>
<td>61.0</td>
<td>61.6</td>
<td>61.5</td>
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<tr>
<td>REA, sq in</td>
<td>14.5</td>
<td>15.0</td>
<td>14.4</td>
</tr>
<tr>
<td>Backfat, in</td>
<td>0.37</td>
<td>0.42</td>
<td>0.34</td>
</tr>
<tr>
<td>KHP, %</td>
<td>2.56</td>
<td>2.62</td>
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<td>1.83</td>
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<td>370</td>
<td>349</td>
<td>321*</td>
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<td>% USDA Choice</td>
<td>40.0</td>
<td>29.2</td>
<td>8.3*</td>
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</table>

AOV: Marbling P < 0.009, % Choice P < 0.03
*Bonferroni t-test: 40% DGS different from control
Sensory Evaluation of Steaks from the Strip Loins of Steers Fed Wet Distillers Grains – Beef Steers

Analysis of Variance

P < 0.05

Tenderness
0 vs. 20
0 vs. 40
20 vs. 40

* Juiciness
0 vs. 20
0 vs. 40
20 vs. 40

Flavor
0 vs. 20
0 vs. 40
20 vs. 40

Overall
0 vs. 20
0 vs. 40
20 vs. 40

Sensory Panel Score

% Wet DGS

- Tenderness
- Juiciness
- Flavor intensity
- Overall
Carcass Value in a Grid Market
Effects of Feeding Wet DGS

Grid: $140/Cwt Choice YG 3
Quality: Prime +$29, CAB +$7, Select -$9, NR -$12
Yield grade: YG 1 +$6.5, YG 2 +$2.5, YG 4 -$15
Weight: 951-1050 lbs -$18, >1050 -$35, 526-550 -$18, <525 -$30

Steers and Heifers
- No Significance

Steers
- No Significance
Effect of Feeding Wet DGS on Distribution of Body Fat

Marbling score/Backfat
- Ratio will decrease
  - Decrease in marbling score
  - Increase in Backfat
  - Less increase in marbling than backfat

**Steers and heifers**: No significant differences
**Steers**: No significant differences
Grid Value ($/carcass) and Marbling Score/BF
Individual Experiments

Steers
137 d
No Sig

Heifers
112 d
No Sig

Steers
113 d
No Sig

Steers
186 d
No Sig
# Effects of Feeding Wet Corn Gluten Feed on Carcass Measurements – Beef Steers

<table>
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<th></th>
<th>Control</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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<tr>
<td><strong>End live wt, lbs</strong></td>
<td>1254</td>
<td>1271</td>
<td>1268</td>
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<tr>
<td><strong>Daily gain, lbs</strong></td>
<td>3.18</td>
<td>3.25</td>
<td>3.24</td>
<td>3.12</td>
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<tr>
<td><strong>Carcass wt, lbs</strong></td>
<td>755</td>
<td>785</td>
<td>775</td>
<td>756</td>
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<td><strong>Dressing %</strong></td>
<td>60.1</td>
<td>61.6*</td>
<td>61.0</td>
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<td><strong>REA, sq in</strong></td>
<td>12.8</td>
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<td><strong>Backfat, in</strong></td>
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<td><strong>KHP, %</strong></td>
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<td>2.78</td>
<td>2.64</td>
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*Dressing %: Low vs. Control P < 0.05
Effects of Feeding Wet Corn Gluten Feed on Marbling Score and Percent Choice – Beef Steers

Analysis of Variance
No significance

Regression analysis
Linear - Quadratic
No significance

36 pens of yearling cattle fed 108 to 215 days
Fed control (0), low 30 or 40), medium (50 or 65), and high (90%) wet CGF
<table>
<thead>
<tr>
<th>Description</th>
<th>Control</th>
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<tbody>
<tr>
<td>End live wt, lbs</td>
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<td>Carcass wt, lbs</td>
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<td>58.6</td>
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<td>REA, sq in</td>
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<td>12.0</td>
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<tr>
<td>Backfat, in</td>
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<td>0.34</td>
<td>0.41</td>
<td>0.40</td>
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<tr>
<td>KHP, %</td>
<td>1.41</td>
<td>1.50</td>
<td>1.46</td>
<td>1.20</td>
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<tr>
<td>Call YG</td>
<td>2.17</td>
<td>2.26</td>
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<td>Marbling score</td>
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<td>526</td>
<td>567</td>
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<td>% USDA Choice</td>
<td>64.2</td>
<td>74.2</td>
<td>78.3</td>
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No significant differences
Sensory Evaluation of Steaks from the Strip Loins of Steers Fed Wet Corn Gluten Feed – Beef Steers

Analysis of variance
No significance
### Effects of Feeding Wet Distillers Grains on Carcass Measurements of Long-Fed Holstein Steers

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>10</th>
<th>20</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>End live wt, lbs</td>
<td>1375</td>
<td>1367</td>
<td>1342</td>
<td>1258*</td>
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<td>Daily gain, lbs</td>
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<td>3.15</td>
<td>3.06</td>
<td>2.78*</td>
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<td>813</td>
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<td>59.4</td>
<td>59.5</td>
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<td>12.1</td>
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<td>11.8</td>
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<td>Backfat, in</td>
<td>0.25</td>
<td>0.29</td>
<td>0.27</td>
<td>0.24</td>
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<td>% USDA Choice</td>
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<td>90.8</td>
<td>83.3</td>
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*P < 0.05  Different from Control
Sensory Evaluation of Steaks from the Strip Loins of Holstein Steers Fed Wet Distillers Grains

Analysis of variance: No significant differences
## Effects of Feeding Dry Distillers Grains on Carcass Measurements of Long-Fed Holstein Steers

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<th>Control</th>
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<tbody>
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<td>End live wt, lbs</td>
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<tr>
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<td>58.1</td>
<td>59.3</td>
<td>59.6</td>
<td>60.0*</td>
</tr>
<tr>
<td>REA, sq in</td>
<td>12.2</td>
<td>12.2</td>
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<td>11.9</td>
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<tr>
<td>Backfat, in</td>
<td>0.25</td>
<td>0.25</td>
<td>0.27</td>
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<td>Call YG</td>
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<td>% USDA Choice</td>
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<td>87.5</td>
<td>77.5</td>
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*P < 0.05 Different from Control
Sensory Evaluation of Steaks from the Strip Loins of Holstein Steers Fed Dry Distillers Grains

Analysis of variance: No significant differences
Conclusions
Feeding Wet DGS to Cattle

1. Feeding high concentrations of wet DGS seems to decrease marbling
   • Starch intake not likely a factor (CGF experiments)
   • Distribution of fat deposition not likely involved (Marbling/BF ratio)
   • Cattle fed DGS consume more dietary oil (unsaturated fatty acids)
   • Data bases analyzed
     i. DGS – aggressive implant program
     ii. CGF – moderate implant program
     iii. Holsteins fed DGS – moderate implant program

2. Net value of the carcasses not significantly decreased
   • Depending on price relationships – net income likely increased

3. Consumer acceptance of the beef not altered