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Effect of Feeding a By-product Combination Consisting of Wet Distillers Grains and Wet Corn Gluten Feed to Feedlot Cattle

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Summary

Two-hundred-and-eighty yearling steers were used to evaluate effects of increasing levels of a corn milling by-product combination (Blend) (50% wet corn gluten feed, 50% wet distillers grains; DM basis) and different alfalfa hay levels on feedlot performance and carcass characteristics. Levels of Blend were 0%, 25%, 50% or 75% diet DM. Alfalfa level was either kept constant at 7.5% of DM or the forage level decreased, i.e., 7.5%, 5.0%, 2.5%, and 0% alfalfa for the 0%, 25%, 50%, and 75% Blend, respectively. Steer DMI, ADG, and F:G responded quadratically ($P < 0.05$), with the greatest ADG and improved at 25% and 50% blend. These results suggest that feeding a 50:50 combination of wet corn gluten feed and wet distillers grains for up to 50% of a diet will enhance cattle performance.

Introduction

Current corn milling by-product utilization in commercial feedlot diets is usually up to 30% of diet DM. The expected growth of the corn milling industry will increase the by-product supply in the future, providing opportunity to increase the amount used. The levels used also may interact with roughage levels in the diet. Traditionally roughage level is fed to manage

acidosis in feedlot cattle. Because corn milling by-products also help with acidosis control, an opportunity may exist to lower roughage levels in diets with higher levels of the by-products. The objectives of this trial were 1) to evaluate the effects of inclusion levels of a by-product mixture of wet corn gluten feed (WCGF) and wet corn distillers grains plus solubles (WDGS), and 2) to evaluate forage inclusion level in feedlot diets on animal performance and carcass characteristics.

Procedure

Two-hundred-and-eighty yearling steers (initial BW = 815 ± 1 lb) were blocked by weight, stratified within block, and assigned to 35 pens (8 steers/pen). Pens were assigned randomly to one of seven treatments (five pens/treatment). Treatments consisted of beef finishing diets containing different inclusion levels of a 50:50 blend (DM basis) of wet distillers grains plus solubles (WDGS) and wet corn gluten feed (WCGF) and alfalfa hay

levels (Table 1). The 50:50 by-products blend (Blend) was included at 75%, 50%, 25% and 0% (DM basis). Alfalfa was included using two scenarios. In the first scenario, all diets (levels of Blend) included 7.5% alfalfa hay. In the second scenario, the level of alfalfa decreased as Blend level increased to supply alfalfa hay at levels of 5%, 2.5% and 0% for the 25%, 50% and 75% Blend levels respectively. Wet distillers grains (Abengoa Bioenergy, York, Nebraska) were delivered weekly and every truckload was sampled. Alfalfa hay, corn and WCGF (Sweet Bran, Cargill, Blair, Nebraska) were sampled weekly. Samples were analyzed for lipid and mineral content. Steers were limit-fed for five days prior to day 1 of the experiment (September 30, 2003), and then weighed on two consecutive days to determine the initial BW. Steers were adapted to treatment diets over 21 days and the finishing diets were fed until the end of the trial. Steers were implanted with Revalor-S[®] on day 21. On day 105

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Table 1. Diets containing different levels of a by-product blend^a fed to finishing steers.

| Ingredients | Treatments ^b | | | | | | |
|-------------------------|-------------------------|--------|--------|--------|------|--------|------|
| | Control | 25/7.5 | 50/7.5 | 75/7.5 | 25/5 | 50/2.5 | 75/0 |
| Corn ^c | 87.5 | 62.5 | 37.5 | 12.5 | 65.0 | 43.0 | 20.0 |
| Wet Distillers Grains | 0.0 | 12.5 | 25.0 | 37.5 | 12.5 | 25.0 | 37.5 |
| Sweet Bran [®] | 0.0 | 12.5 | 25.0 | 37.5 | 12.5 | 25.0 | 37.5 |
| Supplement | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Alfalfa Hay | 7.5 | 7.5 | 7.5 | 7.5 | 5.0 | 2.5 | 0.0 |
| CP | 13.0 | 14.6 | 18.9 | 23.3 | 14.4 | 18.6 | 22.8 |
| eNDF | 0.91 | 1.39 | 1.87 | 1.87 | 1.09 | 1.26 | 1.44 |
| Ether Extract | 2.67 | 3.76 | 5.13 | 5.57 | 3.24 | 5.13 | 5.57 |

^a50:50 blend of wet distillers grains and wet corn gluten feed (DM basis).

^bExpressed as blend/alfalfa hay levels.

^c50:50 blend of high moisture corn (71% DM): dry-rolled corn (DM basis).

Table 2. Effect of different inclusion levels of a by-product blend^a fed to yearling steers.

| Blend | 0 | | 25 | | 50 | | 75 | | | |
|-------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|--------------------|------|--------|--|
| Alfalfa Hay | 7.5 | 5 | 7.5 | 2.5 | 7.5 | 0 | 7.5 | SEM | F Test | |
| DMI, lb/day | 24.3 ^a | 26.3 ^{bc} | 26.5 ^b | 25.4 ^c | 26.1 ^{bc} | 23.0 ^d | 23.6 ^{ad} | 0.30 | <0.05 | |
| ADG, lb/day | 3.99 ^a | 4.70 ^b | 4.57 ^b | 4.55 ^b | 4.56 ^b | 3.86 ^a | 3.93 ^a | 0.11 | <0.05 | |
| F/G | 6.10 ^a | 5.60 ^c | 5.80 ^{bc} | 5.59 ^c | 5.73 ^{bc} | 5.97 ^{bc} | 6.01 ^{ab} | 0.13 | <0.05 | |

^aBlend is a 50:50 blend of wet distillers grains and wet corn gluten feed (DM basis).

^{a,b,c}Different superscripts within a row are different ($P < 0.05$).

Table 3. Main effect of a by-product blend^a fed to yearling steers.

| | 0 | 25 | 50 | 75 | SEM | Li | Quad |
|-------------------------------|------|------|------|------|------|-------|-------|
| DMI, lb/day | 24.3 | 26.4 | 25.8 | 23.3 | 0.2 | <0.05 | <0.05 |
| ADG, lb/day | 3.99 | 4.63 | 4.56 | 3.90 | 0.07 | 0.34 | <0.05 |
| F/G ^b | 6.25 | 5.55 | 5.55 | 5.88 | — | 0.32 | <0.05 |
| Final BW lb | 1277 | 1352 | 1345 | 1264 | 8.75 | 0.34 | <0.05 |
| Calculated YG | 1.85 | 2.37 | 2.08 | 2.10 | 0.08 | 0.27 | <0.05 |
| Marbling Score ^c | 532 | 521 | 518 | 473 | 8.71 | <0.05 | 0.08 |
| 12 th rib fat, in. | 0.37 | 0.45 | 0.46 | 0.38 | 0.02 | 0.60 | <0.05 |
| REA, sq. in. | 14.5 | 14.4 | 14.1 | 14.2 | 0.2 | 0.32 | 0.66 |

^aBlend is a 50:50 blend of wet distillers grains and wet corn gluten feed (DM basis).

^bAnalyzed as G/F.

^c450=Slight⁵⁰, 500=Small⁰, 550=Small⁵⁰, etc.

or 121, steers were harvested at a commercial abattoir. Carcass data were collected after a 24-hour chill. Data were evaluated using Proc Mixed procedure of SAS. Pen was the experimental unit. Model effects were Blend, alfalfa levels, and the interactions. Linear and quadratic effects were analyzed using orthogonal polynomials.

Results

Interactions between alfalfa and Blend levels were observed only on marbling score and calculated yield grade. There were no effects ($P > 0.05$) of alfalfa levels on any of the variables measured within each by-product level (Table 2). For F/G, no differences were observed within a Blend level; however, steers fed less roughage with either 25% or 50% Blend had lower F/G although the difference was not significant. Because little differences were observed by decreasing roughage as the by-product blend increased, our conclusion is that roughages can be decreased from conventional feeding levels as

by-product inclusion increases. Due to little effect across different roughage levels, Blend level was tested as a main effect. Quadratic responses ($P < 0.05$) to Blend level were observed for ADG, DMI and feed conversion (Table 3). Feedlot performance was not significantly different between the steers fed the 25% and 50% Blend diets. Steers fed the diets with a by-product inclusion of 25% or 50% had higher DMI, ADG, and better feed conversion than steers fed the 75% Blend and the control (0% Blend) diets. When the Blend was included at 75%, ADG, DMI, and feed conversion were not different from the control, corn-based diet (0% Blend).

Hot carcass weights were 5% heavier for the 25% and 50% Blend inclusion levels compared with the 0% (control) and the 75% Blend. Calculated yield grade, back fat and rib eye area showed a quadratic response to Blend levels in the diets, while marbling scores showed a trend ($P = 0.08$) for a quadratic response.

Feeding Blend up to 50% of diet DM improved animal performance.

Above the 50% Blend inclusion level, feedlot performance did not differ from the control corn-based diet. Alfalfa level in the diets could be reduced when Blend levels are increased without affecting feedlot performance. Wet distillers grains and wet corn gluten feed may be complementary based on their nutrient compositions. Distillers grains are higher in fat and undegradable intake protein while WCGF is higher in effective fiber. The combination was very effective in this experiment; at the 25% Blend level the energy value was 50% greater than the corn replaced by the Blend. A summary of past research has shown that wet distillers grain has 52% more energy value than corn at 17.4% of the diet. Wet corn gluten feed had 5.1% more energy than corn fed at an average of 35% of the diet. Based on these past studies, we predicted 29% higher values for the blend in this experiment at the 25% and 50% levels. In this experiment, cattle fed 25% Blend performed 44.8% better compared to corn in the control and cattle fed 50% Blend performed 22.4% better than corn in the control. The increased apparent energy value, especially for cattle fed the 25% Blend, is likely due to acidosis control and the complementary effect of the WDGS and WCGF.

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