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Effect of Feeding a By-product Combination at Two Levels or By-product Alone in Feedlot Diets

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Summary

A finishing cattle study was conducted to evaluate feeding a by-product combination at two inclusion levels, compared with these by-products fed alone, or a corn-based diet without by-products. Treatments consisted of 0% by-products, 30% WCGF (wet corn gluten feed), 15% WCGF with 15% WDGS (wet distillers grains with solubles), 30% WDGS, and 30% WCGF with 30% WDGS (DM basis). Final BW, ADG, and F:G were improved for cattle fed by-products, including the 60% Blend. No associative effects resulted from feeding WCGF and WDGS in a blend compared to these by-products fed alone. Feed conversion was similar for feeding a by-product blend at 30 and 60% of dietary DM. A by-product blend at 30% did not have any additive effects, while a blend at 60% had comparable F:G to a blend at 30% with higher gains than the corn diet.

Introduction

Wet corn gluten feed (WCGF) has been shown to have 100-110% the energy content of dry rolled corn that it replaces in feedlot diets (2000 Proceedings American Society of Animal Science) and decreased acidosis challenges. Wet distillers grains with solubles (WDGS) has been shown to have a higher energy content compared to corn ranging from 110-160% *(2006 Nebraska Beef Report,* pp. 51-53). However, the energy content of WDGS declines at dietary inclusion levels greater than 40% DM, possibly due to high dietary fat levels. We hypothesized that combining WCGF and WDGS would result in an associative effect and higher dietary inclusion levels may be fed to utilize more by-products.

Therefore, the objective of this trial was to determine if feeding a WDGS: WCGF combination would be beneficial compared to each by-product alone and if a high by-product blend inclusion would result in better performance than corn-based diets.

Procedure

A 124-day finishing study used 250 crossbred backgrounded steer calves (755 ± 33.3 lb) in a randomized complete block design experiment. Steers were weighed on two consecutive days (day 0 and day 1) to obtain an initial BW after a five-day limit feeding period at 2.0% of BW. The weights obtained from day 0 were used to block the steers into three weight blocks, stratify steers by weight within block, and assign steers randomly to pens. Pens were then assigned randomly within block to one of five dietary treatments with five pens per treatment and 10 steers per pen.

Dietary treatments (Table 1) consisted of control (CON) with no by-products, 30% WCGF (30WCGF, Sweet Bran, Cargill, Blair, Neb.), 15% WCGF with 15% WDGS (30Blend), 30% WDGS (30WDGS, Abengoa Bioenergy, York, Neb.), and 30% WCGF with 30% WDGS (60Blend) on DM basis. The by-product blends were formulated on a 1:1 ratio of WCGF and WDGS (DM basis). Inclusion of by-products in the diets replaced a 1:1 ratio (DM basis) of dry-rolled and high-moisture corn. All diets contained 7% ground alfalfa hay and 5% dry supplement. Adaptation to these finishing diets included a 21-day adaptation period in which corn replaced alfalfa hay at decreasing levels of 44, 34, 24, 14% alfalfa hay for four ration steps and these were fed for 3, 4, 7, and 7 days, respectively. By-product inclusion levels remained the same throughout the adaptation period to the finishing diets except for 60Blend which had 51% by-product, 44% alfalfa hay, and no corn in step 1, then continued with 60% by-product inclusion throughout the remainder of the adaptation diets.

Steers were implanted on day 28 with Revalor-S® (*Intervet, Millsboro, Del.*) Feed samples were collected weekly and analyzed for DM at 60°C for 48 hours.

Steers were slaughtered on day 125 at Greater Omaha Pack, Omaha, Neb., where liver scores and hot carcass weights were recorded. Fat thickness and LM area were measured, while %kidney, pelvic, and heart fat (%KPH) and USDA marbling scores were recorded after a 48-hour chill. Hot carcass weight, fat thickness, LM area, and %KPH were used to calculate yield grade. Final BW, ADG, and F:G were calculated based on

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Table 1. Composition of dietary treatments for cattle fed different by-products alone or blends[a] (%DM).

Ingredient	CON	30WCGF	30Blend	30WDGS	60Blend
Dry rolled corn	44	29	29	29	14
High moisture corn	44	29	29	29	14
Wet corn gluten feed	0	30	15	0	30
Wet distillers grains	0	0	15	30	30
Alfalfa hay	7	7	7	7	7
Dry supplement[b]	5	5	5	5	5

[a]CON = 0% By-product, 30WCGF = 30% WCGF, 30Blend = 15% WCGF + 15% WDGS, 30WDGS = 30% WDGS, 60Blend = 30% WCGF + 30% WDGS.
[b]Formulated to provide 320, 150, and 90 mg/ steer daily Rumensin-80®, Thiamine-40, and Tylan-40®, respectively.

hot carcass weights and adjusted to a common dressing percentage (63) in order to obtain an accurate estimate of final weight and to minimize error associated with gut fill.

Data were analyzed using the mixed procedures of SAS as a randomized complete block design, with pen as the experimental unit.

Results

Cattle fed the by-product diets gained faster and more efficiently than the cattle fed the control diet (Table 2, P < 0.01). ADG was the highest and F:G was the lowest *(P*<0.01) for cattle on the 30WDGS treatment. Steers on the 30Blend treatment had intermediate ADG, DMI, and F:G between 30WCGF and 30WDGS, indicating this treatment did not result in any associative effects. Cattle fed the 60Blend treatment consumed feed similarly, gained numerically faster, and were more efficient *(P*<0.01) than cattle fed CON. Cattle fed 60Blend had lower ADG and DMI *(P*<0.01) than cattle fed 30Blend, but F:G was similar.

With the exception of hot carcass weight, calculated yield grade was the only carcass variable found to be different due to dietary treatment. Steers receiving the CON treatment had the lowest yield grade, while cattle on the 30WDGS treatment had the highest yield grade *(P*<0.01), with the other treatments being intermediate.

In summary, feeding WCGF and WDGS either alone at 30% of diet DM or as a combination at 30 or 60% of diet DM improved cattle performance over feeding the control, corn-based treatment. The 30Blend treatment had intermediate performance to that of 30WCGF and 30WDGS, representing no associative effect. Although 60Blend resulted in lower ADG and DMI than 30Blend, F:G remained similar. The improved feeding performance for 60Blend over CON indicates higher by-product inclusion levels can be fed to feedlot cattle in a combination blend to achieve greater by-product use.

Table 2. Performance measurements and carcass characteristics for cattle fed different by-products alone or blends [a].

Parameter	CON	30WCGF	30Blend	30WDGS	60Blend	*P*-value
Performance						
Initial BW, lb	755	754	756	755	755	0.70
Final BW [b], lb	1262[e]	1312[g]	1325[fg]	1338[f]	1287[e]	<0.01
DMI, lb	23.7[e]	26.2[g]	25.4[fg]	25.0[f]	23.8[e]	<0.01
ADG, lb	4.06[e]	4.47[g]	4.56[fg]	4.67[f]	4.26[e]	<0.01
F:G	5.82[g]	5.86[g]	5.58[f]	5.34[e]	5.60[f]	<0.01
Carcass Characteristics						
Hot Carcass Weight, lb	795[e]	827[fg]	835[fg]	843[g]	811[ef]	<0.01
Marbling Score [c]	481	507	496	487	478	0.14
Ribeye Area, in^2	13.2	13.0	13.2	12.9	13.1	0.39
12^{th} Rib Fat Thickness, in	0.47	0.51	0.52	0.56	0.52	0.78
Calculated Yield Grade [d]	2.84[e]	3.12[fg]	3.12[fg]	3.35[g]	3.07[ef]	<0.01

[a]CON = 0% By-product, 30WCGF = 30% WCGF, 30Blend = 15% WCGF + 15% WDGS, 30WDGS = 30% WDGS, 60Blend = 30% WCGF + 30% WDGS.
[b]Calculated from carcass weight, adjusted to a 63% common dressing percentage.
[c]400 = Slight [0], 500 = Small [0].
[d]Calculated as 2.5 + (2.5*Fat Depth) + (0.2* % KPH) + (0.0038* Hot Carcass Wt.) – (0.32*Ribeye Area) from Meat Evaluation Handbook, 2001.
[efg] Different superscripts within a row are different *(P*<0.05).

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