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Effects of Different Inclusion Levels of Wet Distiller Grains in Feedlot Diets Containing Wet Corn Gluten Feed

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Summary

A finishing trial was conducted to determine the optimum level of inclusion of distillers grains plus solubles (WDGS; Abengoa, York, Neb.) in diets containing 30% wet corn gluten feed (WCGF, Sweet Bran®, Cargill, Blair Neb.) Six WDGS inclusion levels (0, 10, 15, 20, 25, 30%DM) were compared with a dry rolled corn (DRC)/high moisture corn (HMC)-based diet. The inclusion of 30% Sweet Bran® in the diets improved DMI, ADG and feed conversion when compared to a corn-based diet. DMI tended to respond quadratically to WDGS inclusion level, ADG responded quadratically, while F/G was not affected by WDGS level. Diets containing 30% of both WCGF and WDGS improved performance compared with cattle fed no by-products. These results indicate optimumADG and F:G were achieved with inclusions levels of WDGS ranging from 15 to 20% in diets containing 30% WCGF.

Introduction

The Nebraska ethanol and the sweeteners industries provide an abundant and reliable supply of wet distillers grains (WDGS) and wet corn gluten feed (WCGF) respectively. Inclusion of WDGS in finishing diets has consistently resulted in improved cattle performance when compared to corn based finishing diets. The inclusion of WCGF in finishing diets has improved cattle performance by increasing DMI and ADG *(2004 Nebraska Beef Report,* pp 61-63). Optimum inclusion level of WDGS has been defined at 40% DM Basis (*2006 Nebraska Beef Report,* pp 51-53). Higher inclusions of WDGS tended to reduce DMI when compared to a corn based diets likely due to its high fat content. A 50:50 combination of WCGF and WDGS improved performance compared to a corn-based control diet when the blend inclusion level was fed at 25 and 50% (DM basis). In the same trial, cattle fed a 75% DM inclusion level of the blend performed similarly as cattle fed a corn-based finishing diet (*2004 Nebraska Beef Report,* pp.45-46). In a subsequent trial, feeding a 15%:15% blend of WCGF and WDGS did not improve cattle performance when compared with steers fed 30% DM WCGF or WDGS alone (*2007 Nebraska Beef Report,* pp 25-26). The inclusion of 30%DM of WCGF in finishing diets seems to be necessary to minimize acidosis in finishing diets while the optimal inclusion level of WDGS in blends should be determined. The objective of this trial was to determine the effect of increasing WDGS (Abengoa, York, Neb.) inclusion levels in finishing diets containing 30% WCGF (Cargill, Blair Neb.) on animal performance and carcass characteristics.

Procedure

Five hundred and four yearlings steers were blocked by BW (828 ± 36 lb), stratified within block and assigned to 63 pens (8 steers/pen), and pens were assigned randomly to one of seven treatments (nine pens/treatment). Treatments consisted of a corn-based control diet, a diet containing 30% WCGF (Sweet Bran®, Cargill, Blair Neb.), and finishing diets containing increasing (10, 15, 20, 25 and 30%DM) WDGS inclusion levels and 30% WCGF (Table 1). Steers were limit-fed a diet consisting of 50:50 alfalfa:WCGF (DM basis) fed at 2% of BW for 5 days before day 1 of the experiment, and then weighed for two consecutive days to determine initial BW. Steers were adapted to treatment diets in 21 days using five step up diets, where alfalfa hay was replaced by a 50:50 blend of DRC: HMC. Diet supplements were formulated to provide 320mg/head/day of monensin (Rumensin, Elanco Animal Health), 90 mg of tylosin (Tylan, Elanco Animal Health) and 140 mg of thiamine per steer daily. Steers were implanted on day 21 with Revalor-S® (Intervet, Millsboro, Del.) On day 116, steers were harvested and carcass weights and characteristics (dressing percentage, USDA quality and calculated yield grade, kidney heart and pelvic fat, 12th rib fat and LM area) were determined. Final weights were calculated using carcass weights and a common 63% dressing percentage. Data were analyzed using Proc Mixed of SAS, linear and quadratic effects

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Table 1. Composition of dietary treatments[a].

	Treatments[b]						
Ingredients	Control	30/0	30/10	30/15	30/20	30/25	30/30
High moisture corn	44	29	24	21.5	19	16.5	14
Dry-rolled corn	44	29	24	21.5	19	16.5	14
WDGS	—	30	30	30	30	30	30
WCGF	—	—	10	15	20	25	30
Dry supplement	5	5	5	5	5	5	5
Alfalfa hay	7	7	7	7	7	7	7

[a]Values expressed on a DM basis.
[b]Treatments that included wet corn gluten feed (WCGF, Sweet Bran ® Cargill, Blair, Neb.) and wet distillers grains (WDGS, Avengoa, York, Neb.) are expressed as %DM of WCGF / %DM of WDGS.
[c]Supplements provided 320mg/head/day of monensin, 90 mg of tylosin and 140 mg of thiamine per steer daily.

Table 2. Effect of different inclusion levels of WDGS in finishing diets containing 30% WCGF fed to yearling steers for 116 days.

	Treatments[a]										
	DRC/HMC	30/0	30/10	30/15	30/20	30/25	30/30	SEM	Lin	Quad	Con vs. 30% WCGF
DMI lb/d	25.3	26.4	26.4	26.7	26.4	26.2	25.8	1.4	0.22	0.12	0.01
ADG lb	3.59	3.91	3.87	3.98	3.96	3.89	3.77	0.13	0.01	0.05	<0.05
F:G	7.11	6.79	6.86	6.75	6.68	6.79	6.9	0.54	0.8	0.35	0.02
Calculated YG[b]	2.62	2.8	2.93	2.93	2.91	2.7	2.77	0.11	0.42	0.1	0.16
Marbling Score[c]	497	506	517	513	497	506	502	11	0.44	0.49	0.48
12th rib fat, in	0.45	0.46	0.5	0.51	0.51	0.47	0.46	0.02	0.97	0.03	0.82
LM area, in ^{2}	13.91	13.91	13.87	13.99	13.9	14.07	13.71	0.16	0.84	0.42	1

[a]Treatments that included wet corn gluten feed (WCGF, Sweet Bran®,Cargill, Blair, Neb.) and wet distillers grains (WDGS, Avengoa, York Neb.) are expressed as %DM of WCGF / %DM of WDGS.
[b]USDA Yield Grade calculated as 2.5 + (2.5*Fat Depth) + (0.2*2% KPH) + (0.0038*HCW) - (0.32*REA).
[c]USDA called marbling score where 450=Slight^{50}, 500=Small^{0}, 550=Small^{50}, etc.

were determined using orthogonal polynomials. Orthogonal polynomial coefficients were obtained using Proc ILM of SAS.

Results

Steers fed the 30% WCGF, 0%WDGS diet had increased DMI and ADG, and improved F/G compared with steers fed the control diet. There was a significant difference ($P<0.05$) for F/G between the control diet and the diet including 30% WCGF, with the inclusion of WCGF improving F/G by 4.7%. The positive response to the inclusion of 30% WCGF is in agreement with previous research *(2004 Nebraska Beef Report,* pp. 61-63), and this effect could be due to acidosis control as a consequence of replacing starch from corn (DRC and HMC) with fermentable fiber from WCGF.

The inclusion of WDGS in diets with 30% WCGF tended to produce a quadratic ($P=0.12$) effect on DMI. There was a quadratic ($P=0.05$) response in ADG to increasing levels of WDGS, in agreement with previous research (*2006 Beef Report,* pp. 51-53) Higher values for ADG were observed in treatments containing 15 and 20% WDGS (DM basis).

When compared to the 30% WCGF treatment, the inclusion of WDGS did not result in a significantly better F/G. The lack of response to inclusion of 10% WDGS could be due to lack of acidosis control that was already achieved by the inclusion of 30% WCGF. The response observed in the 25 and 30% WDGS diets might be explained as an energy dilution effect as a result of replacing starch from the corn with by-product fiber.

Feed conversion was numerically lowest for the steers fed diets with WDGS inclusion levels of 15 and 20%. The highest inclusion levels of WDGS (30% DM) in feedlot diets containing 30% of WCGF resulted in ADG and F/G that did not differ from the control corn-based diet.

There was a tendency ($P=0.10$) for higher calculated YG in the treatments that included 10, 15 and 20% WDGS (DM basis), as a consequence of the differences ($P=0.03$) observed in 12th rib fat thickness. No significant differences due to treatment were observed in marbling or LM area. These results indicate that optimal cattle performance would be achieved with inclusions levels of WDGS ranging from 15 to 20% in diets containing 30% WCGF.

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