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Using Wet Corn Gluten Feed to Adapt Cattle to Finishing Diets

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Summary

A feedlot trial was conducted to determine if wet corn gluten feed (WCGF) instead of forage could be used to adapt cattle to finishing rations and if this is economically feasible. Treatments were applied only during grain adaptation (26 days), and all steers were finished on a common diet (147 days) containing 35% WCGF. Steers adapted using WCGF had greater ADG and lower F:G. Treatment had no effect on carcass quality. Profits were higher for steers adapted to finishing diets using WCGF rather than those adapted with alfalfa hay.

Introduction

As byproduct availability increases and forage and corn prices continue to vary, feed costs may be reduced by using WCGF in place of forages during the initial adaptation phase. A metabolism trial found greater dry matter intake (DMI) and increased digestibility utilizing wet corn gluten feed (WCGF; Sweet Bran®, Cargill) during grain adaptation when compared to a traditional adaptation using forage *(2009 Nebraska Beef Report,* pp. 56-58).

Objectives of the current study were to determine if adapting cattle to finishing rations using WCGF instead of forage affects 1) performance during the entire finishing period, and 2) feeding profits with different corn and alfalfa hay price scenarios.

Procedure

Animals and Treatments

English x Continental steer calves (n = 240; initial BW = 602 ± 32 lb) were blocked by BW and assigned randomly to one of 12 pens (20 steers/pen). All steers were adapted to the same finishing diet using two different adaptation schemes. Within each scheme, four grain adaptation diets were fed for 5, 7, 7 and 7 days. After adaptation, steers were fed a common finishing diet until slaughter (173 total days; Table 1). Each pen (six pens/treatment) was assigned to one of two grain adaptation treatments. The control treatment (CON) contained 35% Sweet Bran, 15% corn silage and 5% supplement fixed in the diet, with alfalfa hay (AH) decreasing from 37.5% to 0% while a 1:1 ratio of dry-rolled corn (DRC) and high moisture corn (HMC) increased from 7.5% to 45% of the diet (DM basis) for days 1 through 26. The WCGF treatment contained corn silage and supplement at 15% and 5% of the diet, respectively, with Sweet Bran decreasing from 80% to 35% while a 1:1 ratio of DRC and HMC increased from 0% to 45% of the diet (DM basis) for days 1 through 26. A common finishing diet was fed in both treatments from day 27 to finish (173 days).

Prior to trial initiation, steers were limit fed a 1:1 ratio of WCGF and alfalfa hay at 2% of BW to minimize variation in gut fill. Weights were measured two consecutive days (days 0 and 1) to determine initial BW. Orts were collected and weighed when needed throughout the trial and dried in a forced-air oven at 60ºC for 48 hours to calculate DMI and stored for further analysis. All steers were implanted with Synovex Choice® (Fort Dodge Animal Health) on days 1 and 85.

On day 174, steers were slaughtered at a commercial abattoir (Greater Omaha Pack, Omaha, Neb.). Hot carcass weights (HCW) and liver scores were collected on the day of slaughter. Following a 48-hour chill, USDA marbling score, 12th rib fat depth and LM area were recorded. A calculated USDA yield grade (YG) was derived from HCW, fat depth, LM area and an assumed 2.5% kidney, pelvic and heart fat (KPH). Carcass adjusted performance was calculated using a common dressing percentage of 63 to determine final BW, ADG and F:G.

Budget Analysis

All prices for trucking, processing, death loss, medical and vet charges, yardage and sale prices were held constant between treatments. Trucking was valued at $3.25 per loaded mile on a triple axel 55,000 lb weight-bearing trailer. Processing, medical and vet charges were valued at $15.00/head. Death loss costs (2%) were calculated using the initial steer value, and yardage was charged at $0.35/head/day. Interest on the feeder steer and feed cost was valued at 8.5%. Prices for purchased cattle were calculated as a breakeven from the CON steers at each grain price ($3.50, $4.50 and $5.50/bushel) and $120.00/ton alfalfa hay (as-fed basis). The 2007 average fed cattle price, $92.10/cwt (USDA AMS livestock market news), was used.

The total cost of the diet was analyzed by pen for DMI. Corn costs varied from $3.50/bu, $4.50/bu and $5.50/bu; mid-bloom alfalfa hay varied from $80.00/ton, $100.00/ton and $120.00/ton (as-fed basis). WCGF was priced at 95% of the price of corn. Processing costs for HMC and DRC were $4.27/ton and $1.43/ton, respectively, above the current price of corn (Macken et al., 2006, *Professional Animal Scientist*). Corn silage with 50% corn and 35% DM was priced at nine times the price of corn ($3.50, $4.50 or $5.50/bushel) and a $3.00 adjustment factor was added to that value (as-fed basis) then adjusted to a DM basis (Guyer and Duey, 1986, *NebGuide*).

The enterprise budget included actual carcass adjusted performance. Final live BW multiplied by $/cwt was used to calculate total profits per head and to calculate profit/loss (revenue

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Table 1. Dietary composition and days on feed of adaptation methods (DM basis).

Days on feed	1-5	6-12	13-19	20-26	27-173
Adaptation	1	2	3	4	Finisher
CON[1]					
DRC	3.75	8.75	13.75	18.75	22.50
HMC	3.75	8.75	13.75	18.75	22.50
WCGF	35.00	35.00	35.00	35.00	35.00
Corn silage	15.00	15.00	15.00	15.00	15.00
Alfalfa hay	37.50	27.50	17.50	7.50	0.00
Dry supp.[2]	5.00	5.00	5.00	5.00	5.00
WCGF[1]					
DRC	0.00	5.625	11.25	16.875	22.50
HMC	0.00	5.625	11.25	16.875	22.50
WCGF	80.00	68.75	57.50	46.25	35.00
Corn silage	15.00	15.00	15.00	15.00	15.00
Dry supp.[2]	5.00	5.00	5.00	5.00	5.00

[1]Grain adaptation methods: CON = decreasing levels of forage and increasing levels of corn; WCGF = decreasing levels of Sweet Bran and increasing levels of grain (no forage used).
[2]Dry supplement formulated to provide 345 mg/head/day of monensin, 90 mg/head/day of tylosin, and 130 mg/head/day of thiamine.

Table 2. Feedlot performance when evaluating two adaptation methods.

	CON[1]	WCGF[1]	SEM	*P*-value
Performance				
Initial BW, lb	602	601	0.7	0.37
Final BW,[2]	1173	1199	8	<0.01
DMI, lb/day	20.8	20.8	0.3	0.95
ADG, lb	3.30	3.46	0.05	<0.01
F:G[3]	6.31	6.03		<0.01
Carcass Characteristics				
HCW, lb	739	755	5	0.01
Marbling score[4]	511	517	9	0.46
12th Rib fat, in	0.42	0.44	0.01	0.31
LM area, in^2	12.5	12.7	0.1	0.13
Calculated YG[5]	2.88	2.92	0.05	0.52

[1]Grain adaptation methods: CON = decreasing levels of forage and increasing levels of corn: WCGF = decreasing levels of Sweet Bran and increasing levels of grain (no forage used).
[2]Calculated from hot carcass weight, adjusted to a 63% yield.
[3]Calculated from total gain over total DMI, which is reciprocal of F:G.
[4]500 = Small^0.
[5]Where yield grade = 2.5 + 2.5(Fat depth, in) - 0.32(LM area, in^2) + 0.2(KPH fat, %) + 0.0038 (HCW, lb).

Table 3. Economic analysis of grain adaptation with varying prices of alfalfa hay.

	$4.50 X $80.00[1]		$4.50 X $100.00		$4.50 X $120.00		*P*-value[2]
	CON[1]	WCGF[1]	CON[1]	WCGF[1]	CON[1]	WCGF[1]	
Initial Price, $/cwt	105.60	105.60	105.60	105.60	105.60	105.60	
Feed costs, $	307.69	310.84	308.62	310.84	309.55	310.84	0.33
Total costs, $	445.03	448.72	445.99	448.72	446.95	448.72	0.24
Revenue, $/hd	1080.33	1104.28	1080.33	1104.28	1080.33	1104.28	
Cost of gain, $/cwt	76.80	74.11	77.03	74.11	77.26	74.11	<0.01
P/L[4], $/hd	-0.41	20.91	-1.37	20.91	-2.33	20.91	<0.01

[1] Ration combinations with varying alfalfa hay price expressed as DRC price/bushel by alfalfa hay price/ton (DM basis).
[2] No interactions between treatment and alfalfa price ($P > 0.94$). Treatment simple effects presented with *P*-value of main effects noted.
[3]Grain adaptation methods: CON = decreasing levels of forage and increasing levels of corn; WCGF = decreasing levels of Sweet Bran and increasing levels of grain (no forage used).
[4] P/L is profit or loss.

minus total costs) per head. Total feed costs, feed interest and total gain were used to calculate cost of gain (COG).

Results

Cattle Performance

Performance and carcass characteristics are presented in Table 2. By design, initial BW was not different between grain adaptation methods ($P = 0.37$). Final BW at slaughter was greater for steers adapted using WCGF compared to CON fed steers (1,199 vs. 1,173; $P < 0.01$). Intakes did not differ between treatments ($P = 0.95$), but steers adapted with WCGF had greater ADG ($P < 0.01$) and consequently lower F:G ($P < 0.01$). The positive gain response with the WCGF adaptation was likely due to increased diet digestibility (*2009 Nebraska Beef Report,* pp. 56-58) or possibly was caused by a higher energy content in the WCGF adaptation. The only carcass characteristic difference was that HCW was greater ($P = 0.01$) for WCGF adapted steers. USDA marbling score was similar ($P = 0.46$), as well as fat thickness ($P = 0.31$), indicating steers were finished to similar endpoints. Additionally, no differences were observed in LM area ($P = 0.13$) or calculated YG ($P = 0.52$). The increased ADG and decreased F:G for steers adapted with WCGF were due to the 26-day adaptation period, as the diet fed was the same beyond this point.

Budget Analysis

Analysis of varying corn prices of $3.50, $4.50 and $5.50/bushel were compared to varying alfalfa prices of $80.00, $100.00 and $120.00/ton, totaling nine scenarios for each treatment (adjusted to a DM basis). Table 3 shows the budget results when alfalfa hay (AH) prices vary with corn priced at $4.50/bu. No treatment by AH price interaction was observed ($P > 0.94$). Initial steer price ($105.60/cwt) remained constant between treatments, but feed cost and total

costs were not statistically different between treatments ($P > 0.24$). Revenue received was greater for WCGF steers compared to the CON steers ($1104.28 vs. $1080.33) due to additional weight at slaughter. Cost of gain increased ($P < 0.01$) for CON steers ($76.80, $77.03, $77.26/cwt) as AH price increased from $80.00 to $100.00 to $120.00/ton. Cost of gain for WCGF steers ($74.11/cwt) remained constant because AH was not included in the grain adaptation diet. Since initial steer price was set to breakeven for CON cattle, profit and loss (P/L) expressed the absolute differences between treatments. WCGF steers were more profitable ($P < 0.01$) than CON steers by $21.32, $22.28 or $23.24 as AH price increased from $80.00, $100.00 or $120.00/ton, respectively.

When DRC was fixed at $3.50/bushel and AH price varied from $80.00 to $100.00 to $120.00/ton, initial price for steers was $116.10/cwt (data not shown). Feed costs were $246.92, $247.87 and $248.81/head, respectively, for CON steers, while WCGF costs were constant ($248.56/head) as AH price increased. Cost of gain was $58.08/cwt for WCGF steers and was $60.42, $60.65 and $60.89/cwt, respectively, for CON cattle as AH price increased from $80.00 to $100.00 to $120.00/ton. Steers fed WCGF were $24.75/head more profitable than CON steers.

When DRC was fixed at $5.50/bushel and AH price varied from $80.00 to $100.00 to $120.00/ton, initial price for steers was $95.20/cwt (data not shown). Feed costs were $376.11, $377.06 and $378.00/head, respectively, for CON steers, while WCGF costs were constant ($380.88/head) as AH price increased. Cost of gain was $89.00/cwt for WCGF steers and $92.04, $92.27 and $92.50/cwt, respectively, for CON cattle as AH price increased from $80.00 to $100.00 to $120.00/ton. Steers fed WCGF were $21.26/head more profitable than CON steers.

The WCGF adapted steers had higher final BW, equal DMI, increased ADG and decreased F:G. Ration costs were greater for WCGF steers, but the steers were more profitable and had lower COG in each scenario. Utilizing WCGF instead of forage increased gain, making this method more economically favorable for starting cattle on feed than conventional feedlot adaptation (CON) methods currently used in industry. Another benefit for the feedlot industry is that this adaptation system could reduce roughage needs by 50%.

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