ALFALFA HAY LEVELS IN LIMIT-FED, HIGH-ENERGY, GROWING DIETS FOR BEEF STEERS

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Summary

One hundred sixty-four crossbred beef steers were used in a 102-day growing study to determine optimum levels of alfalfa hay in limit-fed, high-energy, growing diets. Diets contained steam-flaked corn and 40% *Sweet Bran*® brand wet corn gluten feed (dry matter basis) with 0, 10, or 20% ground alfalfa hay. A fourth diet containing steam-flaked corn (no *Sweet Bran*) and 20% ground alfalfa hay was used as a control. Average daily gains and feed efficiencies in the growing phase were greater (P<.05) for cattle fed no alfalfa than for cattle fed the control, 10% alfalfa, or 20% alfalfa diets. Steers fed the control and 20% alfalfa diets had increased rates of dry matter intake (P<.05) compared to those fed no alfalfa. At the end of the growing phase, all cattle were placed on a common finishing diet and fed for 101 days. Dry matter intakes during the finishing phase for cattle previously fed no alfalfa were numerically less than intakes for cattle fed other diets and significantly less than intakes for cattle previously fed the control diet. Feed efficiencies were greater for cattle previously fed 20% alfalfa diets than those fed the control diet (P<.05). Average daily gains did not differ (P>.40) among diets during the finishing phase.

(Key Words: Wet Corn Gluten Feed, *Sweet Bran*®, Roughage, Limit Feeding.)

Introduction

Wet corn gluten feed is a by-product of the corn wet milling industry and traditionally has been used in cattle diets as a source of both protein and energy. Because it contains high levels of corn bran, wet corn gluten feed constitutes a valuable source of fermentable fiber in ruminant diets. This study was conducted to determine optimum levels of alfalfa hay in limit-fed, high-energy, growing diets containing steam-flaked corn and wet corn gluten feed.

Experimental Procedures

One hundred sixty-four crossbred beef steers averaging 576 lb were used in a randomized complete block design experiment. Steers had ad libitum access to a common diet for 14 days preceding the growing study to minimize differences in gastrointestinal tract fill. Steers then were blocked by weight and allotted to pens containing five to seven animals per pen, with nine pens per treatment. Treatments (Table 1) consisted of diets containing steam-flaked corn and 40% *Sweet Bran* (DM basis) with 0, 10, or 20% ground alfalfa hay. A fourth diet containing steam-flaked corn and 20% ground alfalfa hay was used as a control. All diets provided 30 grams of Rumensin® per ton of dry matter and were fed once daily at 1.8% of body weight for 88 days. On days 12, 25, 39, 55, 67, and 81, feed was removed 2 hours after feeding, immediately weighed, and returned to the respective feed bunk to measure intake

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rate. Prior to obtaining final weights for the growing phase, cattle had ad libitum access to a common diet for 14 days. At the end of the growing phase, steers were placed onto a common finishing diet, fed for 101 days, and then slaughtered. The final finishing diet (Table 1) contained 82% steam-flaked corn, provided 30 grams per ton of Rumensin (DM basis), and was offered once daily for ad libitum feeding. Steers were weighed approximately every 28 days throughout the entire 203-day period.

Results and Discussion

Performance during the growing phase is shown in Table 2. Decreasing the level of alfalfa hay in limit-fed, high-energy growing diets containing 40% wet *Sweet Bran* (DM basis) increased average daily gain and feed efficiencies. Cattle fed no alfalfa had higher average daily gains and feed efficiencies ($P<.05$) than those fed 10 or 20% alfalfa or control diets. Steers fed the control and 20% alfalfa diets had greater dry matter intake ($P<.05$) than those fed no alfalfa (Table 3). However, no feed-related metabolic disorders such as acidosis or bloat were observed. During the finishing phase (Table 4), dry matter intake was higher for controls than cattle previously fed no alfalfa ($P<.05$), but feed efficiencies were greater for cattle previously fed 20% alfalfa than controls ($P<.05$). Finishing average daily gains did not differ among treatments ($P>.40$). The only significant difference for carcass data was a higher percentage of carcasses grading standard ($P<.10$) for cattle previously fed 10% alfalfa. This study suggests that additional roughage may not be required for beef steers that receive limit-fed, high-energy, growing diets containing 40% wet corn gluten feed.

Table 1. Experimental Diets (% of Dry Matter)

	Diet				
Ingredients	No Alfalfa	10% Alfalfa	20% Alfalfa	Control	Finishing[1]
Sweet Bran®	40.55	40.43	40.31	-	-
Alfalfa hay	-	10.19	20.31	20.53	6.57
Steam-flaked corn	53.93	44.63	35.39	65.08	81.98
Soybean meal	-	-	-	5.35	2.73
Cane molasses	-	-	-	3.77	3.70
Tallow	2.03	2.02	2.02	2.04	2.01
Urea	.39	.19	-	1.13	1.17
Limestone	1.92	1.60	1.27	.95	1.14
Sodium chloride	.39	.29	.19	.39	.28
Potassium chloride	.65	.51	.38	-	.04
Ammonium sulfate	-	-	-	.10	.19
Calcium phosphate	-	-	-	.56	.11
Vitamin/trace mineral premix[2]	.14	.14	.14	.10	.08
Crude protein, analyzed	16.5	17.0	17.6	16.7	14.5

[1]Contained 10 g/ton Tylan®.

[2]Vitamin/trace mineral premix formulated to provide (total diet dry matter): 1,490 IU/lb vitamin A, .05 ppm cobalt, 10 ppm copper, .62 ppm iodine, 60 ppm manganese, .30 ppm selenium, 10 ppm thiamin, 60 ppm zinc, and 30 g/ton Rumensin®.

Table 2. Performance during the Growing Phase for Cattle Limit-Fed Diets Containing 40% *Sweet Bran*® and 0, 10, or 20% Alfalfa Hay

	Diet				
Item	No Alfalfa	10% Alfalfa	20% Alfalfa	Control	SEM
No. of steers	53	55	56	56	
Initial weight, lb	578	577	573	575	7.4
Final weight, lb	873	855	846	855	10.3
Dry matter intake, lb/day	12.4	12.5	12.5	12.7	.15
Average daily gain, lb	2.90[a]	2.73[b]	2.68[b]	2.74[b]	.051
Gain:feed	.233[a]	.219[b]	.215[b]	.217[b]	.0039

[a,b]Means within same row with uncommon superscripts differ (P<.05).

Table 3. Rate of Experimental Dietary Dry Matter Intake as Measured 2 Hours after Feeding on Days 12, 25, 39, 55, 67, and 81

	Diet				
Item	No Alfalfa	10% Alfalfa	20% Alfalfa	Control	SEM
Rate of dry matter intake, lb	8.9[a]	10.2[a,b]	11.0[b]	11.6[b]	.55

[a,b]Means within same row without common superscripts differ (P<.05).

Table 4. Finishing Performance and Carcass Characteristics Following a Growing Period during Which Cattle Were Limit-Fed Diets Containing 40% *Sweet Bran*® and 0, 10, or 20% Alfalfa Hay

	Previous Growing Diet				
Item	No Alfalfa	10% Alfalfa	20% Alfalfa	Control	SEM
No. of steers	53	53	56	55	
Initial weight, lb	873	858	846	853	10.4
Dry matter intake, lb/day	19.9[a]	20.2[a,b]	20.4[a,b]	20.7[b]	.25
Average daily gain, lb	3.12	3.12	3.26	3.14	.068
Gain:feed	.156[a,b]	.154[a,b]	.160[a]	.152[b]	.0025
Hot carcass weight, lb	770	760	761	757	8.6
Ribeye area, in^2	13.3	12.7	13.0	12.7	.28
Fat thickness, in	.43	.43	.43	.44	.020
Kidney, pelvic & heart fat, %	2.1	2.2	2.1	2.2	.066
Liver abscesses, %	2	3	2	2	2.6
Yield grade 1, %	6	6	7	9	3.5
Yield grade 2, %	39	33	41	34	6.5
Yield grade 3, %	51	59	45	53	7.7
Yield grade 4 & 5, %	4	2	7	3	2.6
Marbling score[c]	Sl[97]	Sl[81]	Sl[79]	Sl[82]	8
USDA Choice, %	49	47	42	47	6.1
USDA Select, %	44	48	55	47	5.8
USDA Standard, %	.08[d]	4[e]	1[d,e]	2[d,e]	1.5
Dark cutters, %	7	2	2	4	2.7

[a,b]Means within same row without common superscripts differ (P<.05).

[c]Sl=Slight.

[d,e]Means within same row without common superscripts differ (P<.10).