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Alfalfa hay and wet corn gluten feed levels in steam-flaked corn finishing diets

Abstract

A 153-day finishing experiment was conducted using 631 heifers to determine optimum alfalfa hay and wet corn gluten feed (WCGF) combinations in steam-flaked, corn-based diets. Diets contained either 2 or 6% alfalfa hay and 25, 35, or 45% WCGF (dry basis). Performance was similar ($P>0.16$) for cattle fed 2 or 6% alfalfa hay. Gain efficiencies ($P<0.05$) and fat thickness ($P<0.10$) declined linearly with increasing amounts of WCGF. For heifers fed 2% alfalfa hay, ribeye area increased with increasing dietary WCGF. However for heifers fed 6% alfalfa hay, ribeye area decreased with increasing dietary WCGF. Liver abscesses were lowest for heifers fed 35% WCGF. Alfalfa hay fed at 2% of diet dry matter is sufficient for steam-flaked corn diets containing 25, 35 or 45% WCGF.

Keywords

Cattlemen's Day, 2001; Kansas Agricultural Experiment Station contribution; no. 01-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 873; Beef; Wet corn gluten feed; Steam-flaked corn; Finishing cattle

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ALFALFA HAY AND WET CORN GLUTEN FEED LEVELS IN STEAM-FLAKED CORN FINISHING DIETS

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Summary

A 153-day finishing experiment was conducted using 631 heifers to determine optimum alfalfa hay and wet corn gluten feed (WCGF) combinations in steam-flaked, corn-based diets. Diets contained either 2 or 6% alfalfa hay and 25, 35, or 45% WCGF (dry basis). Performance was similar ($P>0.16$) for cattle fed 2 or 6% alfalfa hay. Gain efficiencies ($P<0.05$) and fat thickness ($P<0.10$) declined linearly with increasing amounts of WCGF. For heifers fed 2% alfalfa hay, ribeye area increased with increasing dietary WCGF. However for heifers fed 6% alfalfa hay, ribeye area decreased with increasing dietary WCGF. Liver abscesses were lowest for heifers fed 35% WCGF. Alfalfa hay fed at 2% of diet dry matter is sufficient for steam-flaked corn diets containing 25, 35 or 45% WCGF.

(Key Words: Wet Corn Gluten Feed, Steam-flaked Corn, Finishing Cattle.)

Introduction

Wet corn gluten feed (WCGF) has been incorporated into many feedlot diets in the Northern plains, usually as an energy replacement for grain, and has effectively replaced 30% of steam-flaked corn in finishing diets. However, a large fraction of WCGF is fermentable fiber. Due to their cost per unit of energy and potential to shrink, roughages such as alfalfa hay are burdensome in finishing diets. We hypothesized that WCGF could be utilized as both an energy and roughage source to replace a

portion of both alfalfa hay and steam-flaked corn.

Experimental Procedures

Six hundred thirty-one crossbred heifers weighing 626 lb were used in a 153-day finishing experiment. Heifers were randomly allocated to pens and stratified by weight to six treatments (2 pens per diet, 48 to 58 heifers per pen). The steam-flaked corn-based diets consisted of 2 or 6% alfalfa hay and either 25, 35, or 45% WCGF (dry basis) in a 2×3 factorial arrangement of treatments. Diet compositions are shown in Table 1.

Heifers were implanted with Synovex[®]C on day 1 and were adapted to the final finishing diets within 21 days. Cattle were offered *ad libitum* access to diets once daily. Final finishing diets provided 300 mg Rumensin[®], 90 mg Tylosin[®], and 0.5 mg MGA[®] per heifer daily. On day 56 heifers were re-implanted with Synovex[®] Plus. Unconsumed feed was collected, weighed, analyzed for dry matter content, and subtracted from the original feed offered to determine actual feed intakes.

Average daily gain and gain efficiencies were calculated using final weights estimated as hot carcass weight divided by a common dressing percentage (63.3%).

Results and Discussion

Feeding performance and carcass characteristics are summarized in Table 2. Dry

¹Minnesota Corn Processors Inc., Marshall, MN.

matter intake, average daily gain and gain efficiencies were similar ($P>0.16$) for cattle fed 2 or 6% alfalfa hay, which suggest that feeding 2% alfalfa hay is sufficient roughage for cattle fed these diets. Dry matter intake tended to increase ($P=0.19$) as the level of WCGF increased; however, average daily gain was not different ($P>0.70$). This resulted in poorer ($P<0.05$) feed efficiencies as dietary WCGF increased. We observed an interaction ($P<0.10$) between levels of alfalfa hay and levels of WCGF for ribeye area. For heifers fed 2% alfalfa hay, ribeye area increased with increasing WCGF. However for heifers fed 6% alfalfa hay, ribeye area decreased with increasing WCGF. Fat thick-

ness decreased linearly ($P<0.10$) as the level of WCGF increased, suggesting a decline in dietary energy with additional WCGF. Although the occurrence of liver abscesses was low (averaging 2.7%), it was lowest when 35% WCGF was fed, implying that a more suitable rumen environment was maintained.

Heifer performance was not affected by reducing alfalfa hay levels to 2% of diet dry matter. Gains were less efficient and carcasses were leaner with increasing levels of WCGF. Alfalfa hay and wet corn gluten feed levels created an interaction for ribeye area.

Table 1. Composition of Experimental Diets (% of diet dry matter)

Ingredient	Level of Wet Corn Gluten Feed					
	2% Alfalfa Hay			6% Alfalfa Hay		
	25%	35%	45%	25%	35%	45%
Flaked corn	63.6	55.1	46.3	60.4	51.6	42.4
Wet corn gluten feed	23.5	33.2	43.1	23.6	33.3	43.2
Alfalfa hay	1.9	1.9	2.0	5.8	5.8	5.9
Tallow	3.0	3.0	3.0	3.0	3.0	3.0
R-T-MGA premix ¹	2.6	2.6	2.5	2.6	2.5	2.6
Soybean meal	2.0	1.0	-	1.4	0.7	-
Urea	1.0	0.9	0.8	1.0	0.9	0.8
Limestone	1.6	1.6	1.6	1.5	1.5	1.5
Sodium chloride	0.3	0.3	0.3	0.3	0.3	0.3
Potassium chloride	0.4	0.3	0.3	0.3	0.3	0.2
Vitamin/trace mineral premix ²	0.1	0.1	0.1	0.1	0.1	0.1
Nutrient, analyzed						
Dry matter, %	69.3	64.0	59.3	69.2	63.9	59.3
Crude protein, %	14.7	15.0	15.2	14.7	14.9	15.3
Calcium, %	0.7	0.7	0.7	0.6	0.6	0.7
Phosphorus, %	0.3	0.3	0.4	0.3	0.3	0.4

¹R-T-MGA premix formulated to provide: 300 mg/heifer/day Rumensin, 90 mg/heifer/day Tylosin, and 0.5 mg/heifer/day MGA.

²Vitamin/trace mineral premix formulated to provide (total diet dry matter): 1,000 IU/lb Vitamin A, 0.13 ppm cobalt, 0.63 ppm iodine, 60 ppm manganese, 0.25 ppm selenium, 60 ppm zinc, 10 ppm thiamin, 10 ppm copper, and 2 ppm iron.

Table 2. Finishing Performance and Carcass Characteristics

Item	Level of Wet Corn Gluten Feed						SEM
	2% Alfalfa Hay			6% Alfalfa Hay			
	25%	35%	45%	25%	35%	45%	
No. of heifers	105	105	104	105	106	106	
Initial weight, lb	628	625	630	623	626	625	12.3
Final weight, lb	1109	1108	1110	1105	1114	1104	20.1
Dry matter intake, lb/day	16.7	17.5	17.3	17.2	17.9	17.6	0.37
Average daily gain, lb	2.55	2.55	2.55	2.56	2.58	2.51	0.049
Feed:gain ^a	6.54	6.85	6.80	6.67	6.94	6.99	0.015
Hot carcass weight, lb	672	673	672	676	683	662	12.6
Dressing percentage	63.1	63.3	63.1	63.7	63.8	62.5	0.38
Ribeye ^b area, in ²	12.5	12.5	12.9	12.6	12.5	12.2	0.16
KPH ^c , %	2.3	2.3	2.2	2.4	2.5	2.3	0.11
Fat thickness ^d , in	0.48	0.47	0.43	0.48	0.50	0.45	0.018
USDA yield grade							
Yield grade 1, %	9	10	10	6	7	6	2.6
Yield grade 2, %	32	27	42	34	32	37	6.0
Yield grade 3, %	46	56	44	50	48	47	5.3
Yield grade 4 & 5, %	14	5	14	8	10	10	3.8
Marbling score ^e	Sm ²⁰	Sm ²⁰	Sm ¹⁴	Sm ⁶⁵	Sm ²⁴	Sm ²⁹	20.5
USDA quality grade							
Prime & Choice, %	59	55	57	68	60	60	8.6
Select, %	39	43	40	30	38	37	8.7
Standard, %	2	2	1	1	2	3	1.7
Dark cutters, %	0	0	1	0	0	0	0.4
Liver abscesses ^f , %	2.7	1.9	2.8	4.7	0.9	2.9	.76

^aWet corn gluten feed level, linear effect (P<0.05).

^bAlfalfa hay × wet corn gluten feed interaction (P<0.10).

^cKPH = Kidney, pelvic & heart fat.

^dWet corn gluten feed level, linear effect (P<0.10).

^eSm = Small.

^fWet corn gluten feed level, quadratic effect (P<0.05).