Effects of Fiber Source on Feedlot Performance and Carcass Characteristics of Yearling Steers

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Story in Brief

Twenty-five crossbred yearling steers were fed to determine the effect of two fiber sources, having distinctly different physical forms and neutral detergent fiber concentration (NDF), on performance and carcass characteristics of feedlot cattle. The two treatments were ground alfalfa hay (ALF) or cottonseed hulls (CSH), 53 and 86% NDF respectively, fed at 8% of diet dry matter. Steers were fed for 103 d, at which time they were harvested and carcass data was collected. Steers fed the ALF diet had greater ADG than CSH cattle. Steers fed the CSH diet showed a tendency to have leaner carcasses and a lower (more desirable) yield grade. No other differences were observed for carcass traits. Our data suggest that roughage source may affect finishing performance and carcass characteristics when included at equal percentages of the ration.

Key Words: Feedlot Cattle, Roughage, Physical Form

Introduction

Feedlot cattle are commonly finished on high concentrate diets to maximize efficiency and minimize cost of gain. Roughages are typically included in finishing rations, at minimal levels, to reduce digestive upset and maintain healthy digestive tract function. Mertens (1996) reported that different sources and physical forms of fiber in dairy cattle rations produce varied responses in milk production and milk fat percentages. These responses were attributed to differences in physical effectiveness of the fiber in stimulation of chewing and salivation, which affects ruminal-buffering capacity. However, Shain (1999) found no difference in performance of feedlot cattle between different sources or physical forms of roughage, including alfalfa, wheat straw and corncobs included at equal levels of neutral detergent fiber (NDF). More data is needed to determine whether performance or carcass merit of feedlot cattle is influenced by the physical effectiveness of roughages.

Materials and Methods

Animals and diets. Twenty-five crossbred yearling steers were received at the Willard Sparks Beef Research Center, Stillwater, OK, and placed on feed on May 24, 2001. Upon arrival all steers were vaccinated (Titanium 5[â], 2 ml) treated for internal and external parasites with Ivomec Plus[â], and implanted with Synovex-S[â] (20 mg estradiol benzoate). Following processing, steers were allotted to either alfalfa (ALF) or cottonseed hull (CSH) treatments and allotted to 6 partially covered pens (3 pens/trt). Steers were adapted to a 92% concentrate diet (Table 1) over a 21-d period using three step-up diets of 40, 30, and 20% roughage, respectively. Steers were fed the final ration for the remainder of the study. Steers were fed twice daily, and slick bunk management was used to maximize feed intake. Weights were recorded at initial processing and on d 28, 56, 84, and at shipping on d 103. Steers were harvested at Iowa Beef Packers, Emporia

KS, and carcass data were collected by trained personnel from Kansas State University. Final live weight was calculated by dividing hot carcass weight by a common dressing percentage (63%).

Table 1. Dry matter composition of final diets.

	Treatments	
Ingredients, %	CSH[a]	Alfalfa
Dry rolled corn	77	77
Alfalfa		8
Cottonseed hulls	8	
Liquid supplement	4	4
Soybean meal, 47.7%	8	8
Wheat midds	1.72	1.72
Limestone	1.00	1.00
Salt	.25	.25
Rumensin 80	.02	.02
Tylan 40	.013	.013
Zinc sulfate	.002	.002
Nutrient Composition, DM basis		
NEm, Mcal/cwt	94.6	95.3
NEg, Mcal/cwt	60.1	61.8
Crude protein, %	13.4	14.4
K, %	.64	.73
Ca, %	.46	.57
P, %	.34	.35

[a] CSH = cottonseed hulls

Statistical Analysis. Data were analyzed as a completely random design using the GLM procedure (SAS Inst. Inc., Cary, NC). The model included roughage source. Pen was the experimental unit for performance analysis, and steer was the experimental unit for analysis of carcass characteristics.

Results and Discussion

Feedlot performance. Steers fed the alfalfa ration had greater ADG (P =.08) compared with steers fed the CSH ration. Calculating the NEg of the treatment diets from feedlot performance (NRC 1996) resulted in an observed NEg of 71.9 and 63.4 Mcal/cwt for ALF and CSH rations respectively. This greater energy density in the ALF ration most likely explains the greater gains of the ALF steers over the CSH steers. No other differences (P >.10) were observed for performance.

Table 2. Least squares means for feedlot steer performance

	Treatment			
Item	CSH[a]	Alfalfa	SEM[b]	P-value
Pens	3	3	--	--
Steers	13	12	--	--
Weight, lb				

Initial	844	850	18.0	.81
Final	1283	1335	31.27	.25
Daily Gain, lb/d				
d 0-end	4.26	4.70	.17	.08
DMI[c] lb/d				
d 0-end	23.8	25.1	.71	.26
Feed efficiency[d]				
d 0-end	5.59	5.32	.13	.22

[a] CSH = cottonseed hulls

[b]Standard error of the least squares means

[c] Average daily dry matter intake

[d] lb of feed/lb or gain

Carcass characteristics. Steers fed CSH as a roughage source had less backfat (P =.06) at harvest than steers fed alfalfa as a roughage source. Lower yield grades (P <.05) were also observed for steers fed CSH compared with steers fed alfalfa. As previously discussed, these differences may be attributed to the greater observed energy density of the ALF diet producing fatter carcasses.

Table 3. Least squares means for carcass characteristics

	Treatment			
Item	CSH[a]	Alfalfa	SEM[b]	P-value
Hot carcass wt, lb	793	820	24.4	.42
Yield Grade	3.04	3.27	.15	.04
Marbling Score[b]	388	360	20.9	.57
Fat thickness, in	.50	.57	.05	.06
Ribeye area, in^2	12.9	13.0	.48	.67

[a] CSH = cottonseed hulls

[b]Standard error of the least squares means

[c]100=Practically Devoid; 200=Traces; 300 Slight; 400=Small; 500= Modest; 600=Moderate; 700=Slightly Abundant; 800=Abundant

Implications

In contrast to previous data, our results suggest that differences exist in performance and carcass characteristics of feedlot cattle between different sources of roughage in feedlot rations. However our results are confounded by the differences in energy value between cottonseed hulls and alfalfa. This may suggest that different roughage sources should be substituted at levels of equal roughage value, such as NDF, rather than as an equal percentage of the ration.

Literature Cited

Shain. et al. 1999. J. Anim. Sci.

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