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The feeding value of wheat and high moisture sorghum grain fed singly and in combination to finishing steers

Abstract

Wheat and high moisture sorghum grain were fed singly and in two combinations in a 121-day feedlot trial at the Garden City Branch Experiment Station. Feed efficiency improved with increasing proportions of wheat in the ration. However, rates of gain were similar for the three wheat-containing rations. Results showed that at least 33% sorghum grain can be substituted for wheat in finishing rations with little influence on performance. The combination rations produced rates of gain that were above predicted values, indicating positive associative effects.

Keywords

Cattlemen's Day, 1986; Kansas Agricultural Experiment Station contribution; no. 86-320-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 494; Beef; Wheat; Sorghum grain; Finishing steers

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The Feeding Value of Wheat and High Moisture
Sorghum Grain Fed Singly and in Combination
to Finishing Steers

Dirk Axe, Keith Bolsen,
Robert Lee,¹ and George Herron²

Summary

Wheat and high moisture sorghum grain were fed singly and in two combinations in a 121-day feedlot trial at the Garden City Branch Experiment Station. Feed efficiency improved with increasing proportions of wheat in the ration. However, rates of gain were similar for the three wheat-containing rations. Results showed that at least 33% sorghum grain can be substituted for wheat in finishing rations with little influence on performance.

The combination rations produced rates of gain that were above predicted values, indicating positive associative effects.

Introduction

The narrow margin of profit with which the cattle feeder has to work has stimulated careful study of the relative values of feeds available and their most effective use.

Sorghum grain's drought resistance and crop rotation potential makes it important to the cattle industry, but it has a low fermentability in the rumen, and is considered less valuable than corn because of its highly variable chemical composition.

Favorable pricing and availability have made wheat an attractive feed grain. Numerous trials have been conducted to determine the feeding value of wheat (Report of Progress 470), but there is little information on its value when fed in combination with other grains.

In some cases, the feeding value of a combination of two grains has been higher than either grain alone, an example of associative effects. Wheat is rapidly and extensively fermented in the rumen. Sorghum grain's low fermentability allows a large portion of its nutrients to be digested in the small intestine. A combination of the two may optimize cattle performance.

This trial was conducted to determine how varying the proportion of wheat and high moisture sorghum grain in beef rations would influence cattle performance.

¹Formerly Garden City Branch Experiment Station.

²Garden City Branch Experiment Station.

Experimental Procedures

A 121-day feedlot trial involving 196 Charolais and Simmental crossbred steers (avg. initial wt. of 750 lb) was conducted at the Garden City Branch Experiment Station. Each treatment was randomly allotted to six pens, at least eight steers per pen, in a randomized complete block design. In the four ration treatments, the grain portion was: 1) all wheat ; 2) 67:33 combination of wheat (W) and sorghum grain (SG) (67W:33SG); 3) 33:67 combination of wheat and sorghum grain (33W:67SG); and 4) and all sorghum grain.

The wheat variety was TAM 105, harvested at 12 to 14% moisture and dry rolled prior to feeding. The sorghum grain was DeKalb DK-42Y, harvested at 25 to 27% moisture and processed in a tub grinder through a .3 inch screen prior to ensiling in a bunker silo. The composition of the rations on a DM basis was: 80% of the appropriate grain or grain combination, 7.8% supplement, 2.2% blended cane molasses, and 10% chopped alfalfa hay. Rations were formulated to contain 14% crude protein and met NRC (1984) mineral and vitamin requirements.

Steers were fed once daily and full weights were taken to establish initial and final weights, with the overall average dressing percent used to adjust final weights. Steers were weighed every 28 days. The feeding period was from February 25 to June 26, 1985.

Results and Discussion

Results for steer performance and carcass traits are shown in Table 4.1. Rates of gain for the wheat and combination rations were similar, with the sorghum grain ration producing 12.9% slower ($P < .05$) gains. Feed intake was 14.9% lower ($P < .05$) for the wheat and 67W:33SG rations compared with the 33W:67SG and sorghum grain rations. However, the wheat and 67W:33SG rations were utilized 32.5% and the 33W:67SG ration 14.1% more efficiently ($P < .05$) than the sorghum grain ration. Carcass characteristics were similar among treatments, except for dressing percent and quality grade. Steers receiving the 33W:67SG ration had a higher ($P < .05$) dressing percent than those receiving the wheat ration, and quality grade was greater ($P < .05$) for steers fed the 67W:33SG ration compared with those fed the wheat and 33W:67SG rations.

The performance data of the wheat vs. sorghum grain rations were plotted and a straight line drawn between them (Figures 4.1. and 4.2). The plots showed that rate of gain was 5.0% ($P = .17$) and 6.3% ($P = .08$) greater (Figure 4.1) and feed efficiency was 6.7% ($P = .10$) and 3.9% ($P = .27$) better (Figure 4.2) for the 67W:33SG and 33W:67SG rations, respectively, compared with predicted values calculated from the plots. These differences represent positive associative effects, whereby the values of the combination rations were higher than that predicted from the grains fed singly.

Table 4.1. Effect of Ration on Feedlot Performance and Carcass Traits of Finishing Steers

Item	Ration			
	Wheat	67W:33SG	33W:67SG	Sorghum Grain
No. of Steers	48	48	48	52
Initial Wt., lb	750	735	759	757
Final Wt., lb	1100	1089	1104	1067
————— Feedlot Performance —————				
Avg. Daily Gain, lb	2.91 ^a	2.93 ^a	2.85 ^a	2.56 ^b
Daily Feed Intake, lb ¹	16.74 ^a	17.56 ^a	19.47 ^b	19.95 ^b
Feed/lb of Gain, lb ¹	5.78 ^a	6.03 ^a	6.86 ^b	7.83 ^c
————— Carcass Traits —————				
Dressing, %	62.6 ^b	63.3 ^{ab}	63.6 ^a	63.2 ^{ab}
Quality Grade ²	8.8 ^b	9.6 ^a	8.6 ^b	9.2 ^{ab}
Yield Grade	2.29	2.27	2.22	2.22
Fat Thickness, in	.32	.31	.31	.28
Ribeye Area, in	12.1	11.9	12.4	11.9

^{a,b,c} Values in the same row with different superscripts differ (P<.05).

¹ 100% dry matter basis.

² Average good = 8.0, high good = 9.0.

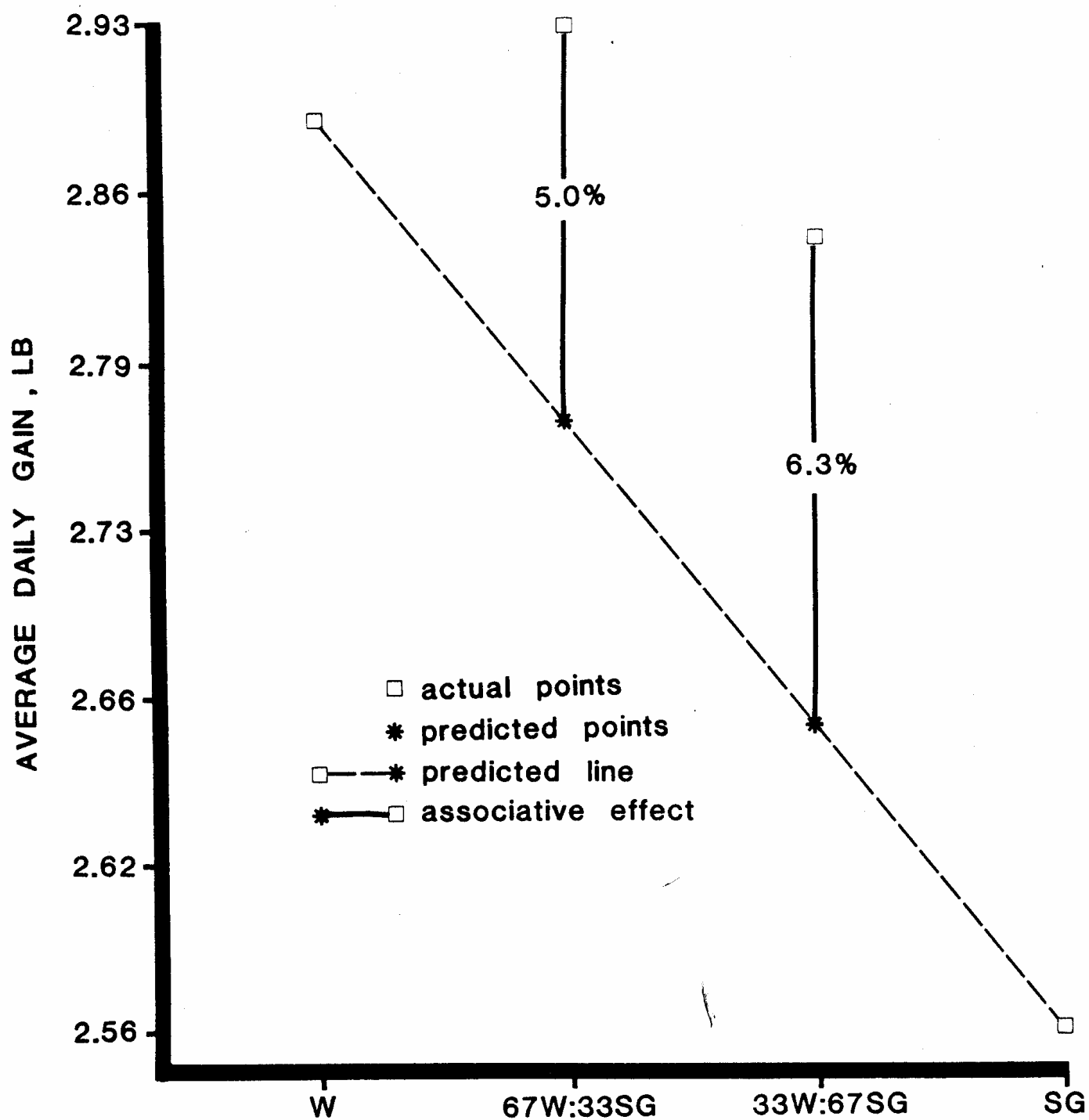


Figure 4.1. Average Daily Gain for Steers Fed the Four Rations.

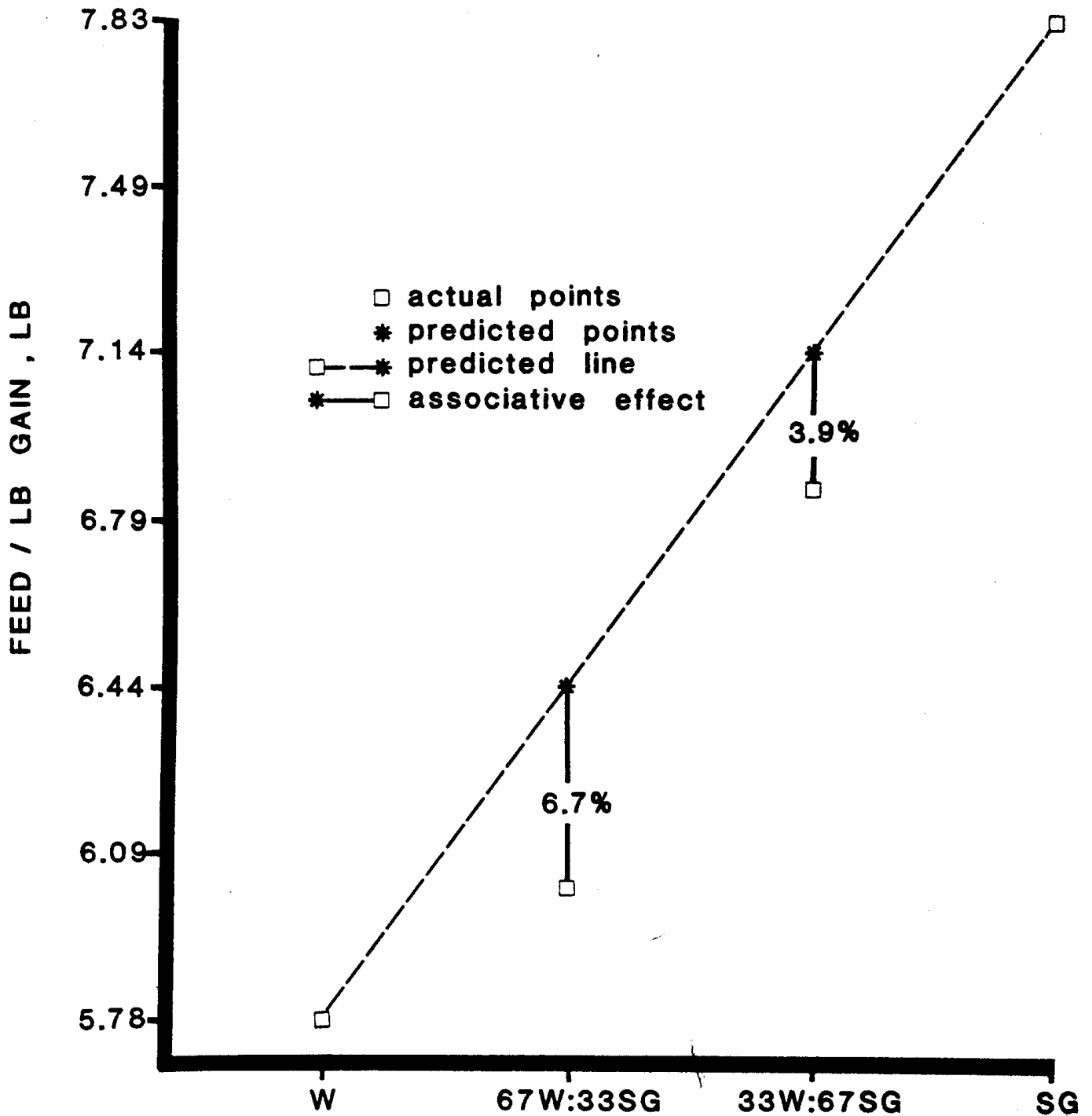


Figure 4.2. Feed/lb Gain for Steers Fed the Four Rations.