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## Effect of Grain Source and Brewer's Grain on the Performance and Serum Cholesterol Concentration of Finishing Steers

Gary Goldy and Jack Riley

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### Summary

The inclusion of brewer's grains at 20% of the ration dry matter increased dry matter intake, resulting in poorer feed efficiency. Brewer's grain appeared to increase serum cholesterol. Serum cholesterol increased as days on feed increased, similar to other reported studies. Steers fed grain sorghum had greater dry matter intakes and poorer feed efficiencies than those fed barley or wheat. Analysis of tissue samples has not been completed at this time, which prohibits drawing any conclusions as to the effect on tissue cholesterol concentrations.

### Introduction

The acceptance and consumption of beef might be enhanced if the cholesterol content of beef could be effectively lowered, and still maintain its high eating quality.

Barley and barley byproducts have been shown to have serum cholesterol-lowering properties in monogastrics. One study has indicated that barley may lower tissue cholesterol content in swine. Our objective was to evaluate the effect of various grains and a barley-based brewer's grain on the performance and the cholesterol content of serum and tissue of finishing steers.

### Experimental Procedures

Thirty six Hereford and Hereford x Angus crossbred steers were blocked by weight to one of six treatment rations in a 2 X 3 factorial design. Dried brewer's grains were fed at 20% of the ration (dry matter basis) or omitted. The grain portion of the ration was either barley, grain sorghum, or wheat. All of the grains were dry-rolled. The composition of the experimental diets is shown in Table 37.1. Steers were housed and fed in individual pens at the Kansas State University Beef Research Unit, during the fall of 1987. Initial and final weights were determined after an overnight shrink. Jugular blood samples were taken on days 0, 28, 56, 70, 84, and 112 of the trial. Serum was harvested and stored frozen until analyzed for cholesterol concentration by an auto-analyzer procedure. A steak from the 12th rib was recovered from each carcass for cholesterol analysis of the lean and adipose tissue.

### Results and Discussion

Effect of Grain Source. The performance of finishing steers fed the three grains is shown in Table 37.2. Dry matter intakes of steers consuming grain sorghum were greater ( $P < .05$ ) than those of steers fed barley or wheat. Average daily dry matter intakes ranged from 20.95 to 23.71 pounds. Since average daily gains did not differ significantly among cattle on the three grains, (range, 3.00 to 3.28 lb per day),

feed efficiencies of steers fed grain sorghum were poorer ( $P < .05$ ) than those of steers fed either barley or wheat. Feed efficiencies ranged from 6.61 to 7.90. Carcass characteristics were not affected by grain type. Serum cholesterol increased with days on feed for all grain types. Significant differences in serum cholesterol were found between different grain sources. However, the interpretation of this observation is still uncertain.

Effect of Brewer's Grain. The performance and serum cholesterol content of finishing steers consuming brewer's grain is shown in Table 37.3. The average daily dry matter intake of steers was significantly increased with the addition of brewer's grain to the diet; however, average daily gains did not differ. Therefore, steers consuming 20% of their ration as brewer's grain had poor feed efficiencies compared to controls. Carcass characteristics were not affected by the addition of brewer's grain to the diet. The serum cholesterol concentration of steers consuming brewer's grain was significantly increased from day 28 to day 112. Tissue cholesterol analyses are not yet complete, so conclusions regarding the significance of that finding are premature.

Table 37.1. Composition of Experimental Diets

Item	Brewer's Grain	
	+	-
	(% Dry Matter Basis)	
Dry Rolled Grain	60	80
Brewer's Grain	20	0
Sorghum Silage	15	15
Supplement <sup>1</sup>	5	5

<sup>1</sup>Barley, grain sorghum or wheat supplements (six steers per grain source) each containing 12.5 mg Rumensin per lb.

Table 37.2. Effect of Grain Source on the Performance and Serum Cholesterol Concentration of Finishing Steers

Item	Grain Source		
	Barley	Grain Sorghum	Wheat
No. Steers	11	12	12
Initial Wt., lb	747	742	742
Final Wt., lb	1115	1079	1083
Daily Feed Intake, lb	21.44 <sup>b</sup>	23.71 <sup>a</sup>	20.95 <sup>b</sup>
ADG, lb	3.28 <sup>b</sup>	3.00 <sup>a</sup>	3.04 <sup>b</sup>
Feed/Gain	6.61 <sup>b</sup>	7.90 <sup>a</sup>	6.92 <sup>b</sup>
No. Liver Abscesses	0	0	4
Percent Choice	72.7	83.3	75.0
<u>Serum Cholesterol, mg/dl</u>			
Day 0	100	106	105
Day 28	139 <sup>b</sup>	170 <sup>a</sup>	130 <sup>b</sup>
Day 56	127 <sup>b</sup>	146 <sup>a</sup>	134 <sup>ab</sup>
Day 70	155 <sup>b</sup>	169	150
Day 84	168 <sup>b</sup>	214 <sup>a</sup>	188 <sup>a</sup>
Day 112	208	241	288

<sup>abc</sup> Means in the same row with different superscripts are different (P<.05).

Table 37.3. Effect of the Addition of Brewer's Grain on the Performance and Serum Cholesterol Concentration of Finishing Steers

Item	Brewer's Grain	
	-	+
No. Steers	18	17
Initial Wt., lb	744	744
Final Wt., lb	1088	1097
Daily Feed Intake, lb	22.69 <sup>a</sup>	1.38 <sup>b</sup>
ADG., lb	3.07	3.14 <sup>b</sup>
Feed/Gain	7.46 <sup>a</sup>	6.83 <sup>b</sup>
Percent Choice	83.3 <sup>b</sup>	91.4 <sup>a</sup>
No. Liver Abscesses	3	1
<u>Serum Cholesterol, mg/dl</u>		
Day 0	103	105
Day 28	168 <sup>a</sup>	125 <sup>b</sup>
Day 56	164 <sup>a</sup>	136 <sup>b</sup>
Day 70	180 <sup>a</sup>	142 <sup>b</sup>
Day 84	238 <sup>a</sup>	142 <sup>b</sup>
Day 112	267 <sup>a</sup>	184 <sup>b</sup>

<sup>ab</sup> Means in the same row with different superscripts are different (P<.05).