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Comparison of dried full-fat corn germ and tallow in finishing feedlot diets for heifers

Abstract

A trial was conducted using 588 finishing beef heifers (705 lb initially) to compare tallow and dried full-fat corn germ as supplemental energy sources. Pens of 20 to 50 heifers were fed finishing diets containing 1) tallow or 2) corn germ. The tallow diet contained (dry basis) 46% steam-flaked corn, 35% wet corn gluten feed, 3% alfalfa hay, 1.5% soybean meal, and 4% tallow. The corn germ diet contained 41% steam-flaked corn, 35% wet corn gluten feed, 3% alfalfa hay, and 10% corn germ. Diets provided 300 mg monensin, 90 mg tylosin, and 0.5 mg MGA per heifer daily and were fed ad libitum once daily for 110 days. Gains of 2.99 lb/day for tallow and 2.95 lb/day for corn germ were not different ($P>0.30$), but dry matter intake tended to be greater for cattle fed corn germ than for those fed tallow ($P=0.10$; 16.7 vs 16.4 lb/day, respectively). Consequently, cattle fed germ were 3.4% less efficient than cattle fed tallow ($P<0.04$). Hot carcass weight was not different ($P>0.40$) between treatments. Cattle fed corn germ had more carcasses grading prime ($P=0.03$), more carcasses grading average choice or higher ($P<0.05$), and tended to have more marbling ($P=0.08$) than cattle fed tallow. Incidence of liver abscesses was higher ($P<0.02$) for cattle fed corn germ than for those fed tallow (4.8% vs 1.8%, respectively). These results indicate that corn germ is a suitable substitute for tallow in finishing rations.

Keywords

Cattlemen's Day, 2003; Kansas Agricultural Experiment Station contribution; no. 03-272-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 908; Beef; Dried full-fat corn germ; Tallow; Finishing diets; Heifers

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COMPARISON OF DRIED FULL-FAT CORN GERM AND TALLOW IN FINISHING FEEDLOT DIETS FOR HEIFERS

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Summary

A trial was conducted using 588 finishing beef heifers (705 lb initially) to compare tallow and dried full-fat corn germ as supplemental energy sources. Pens of 20 to 50 heifers were fed finishing diets containing 1) tallow or 2) corn germ. The tallow diet contained (dry basis) 46% steam-flaked corn, 35% wet corn gluten feed, 3% alfalfa hay, 1.5% soybean meal, and 4% tallow. The corn germ diet contained 41% steam-flaked corn, 35% wet corn gluten feed, 3% alfalfa hay, and 10% corn germ. Diets provided 300 mg monensin, 90 mg tylosin, and 0.5 mg MGA per heifer daily and were fed ad libitum once daily for 110 days. Gains of 2.99 lb/day for tallow and 2.95 lb/day for corn germ were not different ($P>0.30$), but dry matter intake tended to be greater for cattle fed corn germ than for those fed tallow ($P=0.10$; 16.7 vs 16.4 lb/day, respectively). Consequently, cattle fed germ were 3.4% less efficient than cattle fed tallow ($P<0.04$). Hot carcass weight was not different ($P>0.40$) between treatments. Cattle fed corn germ had more carcasses grading prime ($P=0.03$), more carcasses grading average choice or higher ($P<0.05$), and tended to have more marbling ($P=0.08$) than cattle fed tallow. Incidence of liver abscesses was higher ($P<0.02$) for cattle fed corn germ than for those fed tallow (4.8% vs 1.8%, respectively). These results indicate that corn germ is a suitable substitute for tallow in finishing rations.

Introduction

Fat is commonly added to finishing diets to increase energy density and to improve efficiency of gain in feedlot cattle. Corn germ is a high-fat byproduct produced by the corn wet milling industry during the production of sweeteners and(or) fuel ethanol. Use of liquid fats such as tallow is limited to operations with special equipment such as heated tanks and pump systems. In contrast, corn germ is easily handled using conventional bins and auger systems. Corn germ also can be stored for an extended period of time without the risk of oxidative rancidity, due to its low moisture content. Corn germ contains between 46 and 54% fat, and 12 to 15% protein on a dry matter basis (Table 1). The objective of this study was to compare tallow and dried full-fat corn germ as supplemental energy sources on performance and carcass characteristics of finishing cattle.

Experimental Procedures

Five hundred eighty-eight crossbred heifers (705 ± 8 lb initially) housed in 16 pens of 20 to 50 heifers each were blocked by previous treatment (MGA or no MGA in the receiving diet) and randomly allocated to finishing diets containing 1) tallow or 2) corn germ. Diets were fed ad libitum once daily, and the amount of feed offered was determined by a 7:00 a.m. feed call so that only traces remained each day. Heifers were

¹Minnesota Corn Processors, Marshall, MN.

implanted with Revalor-H and transitioned to their respective experimental diet. The corn germ was added to diets in amounts to provide the same amount of fat as the tallow, and it additionally replaced 4.7% steam-flaked corn and 1.5% soybean meal such that diets contained the same levels of protein (Table 2). Diets were formulated to provide 300 mg monensin, 90 mg tylosin, and 0.5 mg MGA per heifer daily. On day 100, 25% of the cattle from each treatment were shipped for slaughter. The remaining cattle were shipped on day 130. Cattle were slaughtered at a commercial abattoir in Emporia, KS, and carcass data were obtained following a 24-hour chill.

Table 1. Ingredient Composition

Item	Ingredient	
	Tallow	Corn Germ
Dry matter, %	99.9	96.1
Crude protein, %	0.0	12.8
Calcium, %	0.0	0.03
Phosphorus, %	0.0	0.33
Crude fat, %	99.9	45.0
F.O.B. cost per ton ¹ , \$	340	285

¹As of 1/8/03.

Results and Discussion

Table 3 summarizes the performance and carcass characteristics of cattle fed finishing diets containing tallow or dried full-fat corn germ. Gains of 2.99 lb/head for tallow and 2.95 lb/head for corn germ were not different ($P>0.30$), but dry matter intake tended to be greater for cattle fed corn germ than for cattle fed tallow ($P=0.10$; 16.7 vs 16.4 lb/day, respectively). Consequently, cattle fed germ were 3.4% less efficient than cattle fed tallow ($P=0.04$). Hot carcass weight was not different ($P>0.40$) between treatments. Cattle fed corn germ had more carcasses grading prime ($P=0.03$), more carcasses grading average choice or higher ($P=0.04$), and tended to have more marbling ($P=0.08$) than cattle fed tallow. The incidence of liver abscesses was higher ($P=0.01$) for cattle fed corn germ than for cattle fed tallow (4.8% vs 1.8%, respectively). Our results indicate that when priced appropriately corn germ is a suitable substitute for tallow as a supplemental energy source in finishing diets. For operations that are not equipped to handle liquid fat, corn germ may be an effective means of incorporating supplemental fat into the diet.

Table 2. Experimental Diets (Dry Matter Basis)

Ingredient, %	Treatment	
	Tallow	Corn Germ
Steam-flaked corn	46.2	41.4
Wet corn gluten feed	35.0	35.0
Alfalfa hay	3.0	3.0
Steep liquor	8.1	8.1
Tallow	4.1	-
Corn germ	-	10.3
Soybean meal	1.5	-
Vitamin/mineral premix ¹	1.6	1.6
R-T-MGA premix ²	2.5	2.5
Crude protein, analyzed	12.8	12.9
Cost per ton, \$ ³	78.8	75.0

¹Formulated to provide 1660 IU/lb vitamin A, 10 IU/lb vitamin E, 0.13 ppm Co, 0.63 ppm I, 60 ppm Mn, 0.30 ppm Se, and 60 ppm Zn.

²Formulated to provide 300 mg monensin, 90 mg tylosin, and 0.5 mg MGA per heifer daily.

³As of 1/8/03.

Table 3. Performance and Carcass Characteristics of Heifers Fed Tallow or Dried Full-Fat Corn Germ

Item	Treatment		SEM	P-value
	Tallow	Corn Germ		
Number of heifers	285	303	-	-
Number of pens	8	8	-	-
Initial weight, lb	707	702	8.2	0.66
Final weight, lb	1047	1038	7.9	0.41
Daily gain, lb	2.99	2.95	0.03	0.33
Feed intake, lb/day	16.37	16.72	0.14	0.10
Feed:gain	5.47	5.67	-	0.04
Liver abscesses, %	1.9	4.8	0.73	0.01
Carcass weight, lb	676	670	5.1	0.42
Dressing, %	64.6	64.3	0.16	0.17
Ribeye area, inch ²	11.79	11.79	0.17	0.99
12th rib fat thickness, inch	0.54	0.55	0.01	0.80
Kidney, pelvic, & heart fat, %	2.45	2.50	0.03	0.19
Marbling score	Small30	Small49	7.0	0.08
Prime, %	2	6	1.1	0.03
Choice, %	71	66	2.5	0.18
Average Choice or greater, %	14	21	2.1	0.04
Select, %	27	27	2.7	0.98
Yield grade 1, %	3	3	0.9	0.96
Yield grade 2, %	24	25	3.1	0.83
Yield grade 3, %	55	55	2.2	0.93
Yield grade 4 & 5, %	18	17	1.8	0.78