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## Dose response to supplemental fat by finishing steers

### Abstract

A trial with 100 head of crossbred steers (avg wt 879 lb) was conducted to determine the effects of tallow (none, 2, 4, 6, 8% of ration dry matter) on the performance and carcass characteristics of finishing cattle fed a corn-based diet. Protein levels were maintained at a constant ratio to the calculated metabolizable energy concentration of the diets. Initially, feed intake decreased as tallow increased; however, similar intakes were obtained after 11 days. Dry matter intakes throughout the finishing period were reduced 5.2, 6.9 and 7.7%, respectively, for the 4, 6 and 8% tallow diets. Average daily gain was similar for the control, 2, and 4% levels and declined 4.9 and 13.3% for the 6 and 8% tallow diets, respectively. Feed efficiency had a quadratic relationship with added fat and was best at 4% fat. There were no significant differences in carcass traits among treatments. Therefore, for steers finished on corn-based diets, 4% tallow appeared to be optimum, considering performance, efficiency, and carcass quality.

### Keywords

Cattlemen's Day, 1990; Kansas Agricultural Experiment Station contribution; no. 90-361-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 592; Beef; Tallow; Finishing; Performance; Carcass traits

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**K****S****U****DOSE RESPONSE TO SUPPLEMENTAL FAT  
BY FINISHING STEERS****S. M. Gramlich, R. T. Brandt, Jr.,  
and R. V. Pope**

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**Summary**

A trial with 100 head of crossbred steers (avg wt 879 lb) was conducted to determine the effects of tallow (none, 2, 4, 6, 8% of ration dry matter) on the performance and carcass characteristics of finishing cattle fed a corn-based diet. Protein levels were maintained at a constant ratio to the calculated metabolizable energy concentration of the diets. Initially, feed intake decreased as tallow increased; however, similar intakes were obtained after 11 days. Dry matter intakes throughout the finishing period were reduced 5.2, 6.9 and 7.7%, respectively, for the 4, 6 and 8% tallow diets. Average daily gain was similar for the control, 2, and 4% levels and declined 4.9 and 13.3% for the 6 and 8% tallow diets, respectively. Feed efficiency had a quadratic relationship with added fat and was best at 4% fat. There were no significant differences in carcass traits among treatments. Therefore, for steers finished on corn-based diets, 4% tallow appeared to be optimum, considering performance, efficiency, and carcass quality.

(Key Words: Tallow, Finishing, Performance, Carcass Traits.)

**Introduction**

Fat additions to finishing diets provide the opportunity to increase the energy content, while increasing the cohesiveness of small particles and reducing the dustiness of the diet. Research evaluating various types of fat additions has been conducted at Kansas State University and other research centers. However, the optimum level of supplemental fat has not been clearly determined. Further, the use of supplemental fat in corn-based diets may be less beneficial because of corn's higher oil content; 4.2% vs 2.4% for sorghum and 1.8% for wheat (NRC, 1984). The purpose of this study was to determine the optimum level of tallow addition to corn-based diets for finishing cattle, based on animal performance and carcass characteristics.

**Experimental Procedures**

One hundred English crossbred steers (avg wt 879 lb) were blocked on the basis of weight to four replicates and randomly assigned to one of five treatments: control, 2, 4, 6, or 8% tallow (dry basis). Animals were weighed on two consecutive days, implanted with Compudose 200; vaccinated against IBR, BVD, and PI<sub>3</sub>; and dewormed with Ivomec®.

Steers were stepped up to a high concentrate finishing diet (without added fat) in a large common pen before being weighed and assigned to their respective treatments. The final diet dry matter composition was 10% supplement, 10% roughage (5% sorghum silage, 5%

ground prairie hay), 2% molasses, the treatment level of tallow, and the balance dry rolled corn. Diets were formulated to maintain a constant ratio of metabolizable energy to crude protein, based on NRC values. The no added fat diet was formulated for 12% crude protein. Urea was held constant across diets, and soybean meal provided the balance of supplemental protein. Tylosin was added to supply 10 g per ton of complete diet.

Diets were mixed daily in a stationary horizontal mixer. The supplement and grain components were mixed, and then the tallow and molasses were applied. After several minutes of mixing, the roughage components were blended in. Rations were then weighed out for each pen and transported to the bunk. During the first 14 d, daily feed not consumed was collected to determine pen intakes as cattle adapted to the treatment diets.

Animals were slaughtered after 59 (heavy replicate) or 75 d. Following a 24-hr chill, ribeye area; fat thickness; kidney, heart, and pelvic fat; and yield and quality grades were determined.

### Results and Discussion

Figure 2.1 represents the dry matter intake when cattle were first fed tallow. Steers were started on their respective treatment level of tallow without benefit of an adjustment period. Tallow additions initially depressed feed intake in all diets, with the intensity of the depression related to tallow level. Intakes of tallow-containing diets approximated that of the control diet after 11 d, underscoring the need to adjust finishing cattle gradually to supplemental fat. Further, because of its negative effect on fiber digestion, supplemental fat in receiving and early step-up rations may be counter-productive.

Average dry matter intake computed for the entire feeding period decreased linearly ( $P < .01$ ) with increased tallow (Table 2.1) and was reduced 5.2, 6.9, and 7.7% for the 4, 6, and 8% tallow diets, respectively. The reason for depressed intake is not fully understood. The initial reduction in intake could result from palatability preferences or from the need of the ruminal environment to adapt. Research is currently under way to determine how the ruminal environment responds to tallow additions.

Average daily gain responded quadratically ( $P < .01$ ), because steers gained at similar rates when fed control, 2 or 4% added tallow, then declined 4.9 and 13.3% with the 6% and 8% diets, respectively. Feed efficiency responded quadratically ( $P < .03$ ), with peak efficiency occurring at 4%

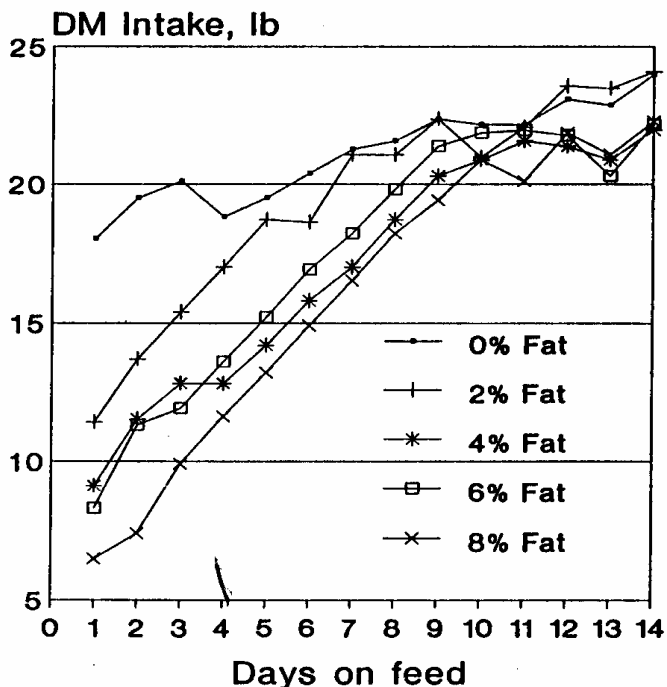


Figure 2.1. Initial Feed Intake Response to Percent Tallow in the Diet

**Table 2.1. Performance and Carcass Characteristics for Finishing Steers on Tallow Diets**

Item	Control	Tallow level, percent of dry matter				SE
		2	4	6	8	
Daily feed, lb DM <sup>a</sup>	23.3	23.7	22.1	21.7	21.5	.58
Daily gain, lb <sup>b</sup>	3.84	3.88	3.88	3.65	3.33	.087
Gain/feed <sup>c</sup>	.165	.164	.175	.168	.155	.0046
Gain/Mcal ME <sup>d</sup>	.103	.101	.107	.101	.095	.0047
Ribeye area, in. <sup>2</sup>	13.15	13.41	12.90	13.00	12.73	.249
Backfat, in.	.55	.51	.51	.54	.53	.033
KPH, %	2.68	2.80	2.68	2.69	2.74	.103
Yield grade <sup>e</sup>	2.86	2.68	2.84	2.84	2.87	.139
Percent Choice	80	75	70	68	60	

<sup>a</sup>Dry matter intake. Linear ( $P < .01$ )

<sup>b</sup>Average daily gain. Linear ( $P < .001$ ), Quadratic ( $P < .01$ )

<sup>c</sup>Gain/feed. Quadratic ( $P < .03$ )

<sup>d</sup>Gain per Mcal metabolizable energy. Quadratic ( $P < .05$ )

<sup>e</sup>Calculated USDA yield grade.

supplementation. The efficiency of gain when evaluated per unit of energy consumed showed a quadratic response ( $P < .05$ ). The 4% tallow diet was 3.9, 5.9, 5.9, and 12.6% more efficient, respectively, than the control, 2, 6, or 8% diets. Metabolic responses to tallow in the diet are currently being evaluated to help explain why this response was observed.

Treatment caused no differences in ribeye area, backfat thickness, kidney pelvic fat, or quality or yield grade. It should be noted that increased carcass fatness has been observed in previous research trials in which fats or oils were fed for longer periods of time.

The performance of heavy feeder steers fed a corn-based diet can be enhanced by adding up to 4% tallow to the diet. Whether the improvement in efficiency noted in this study is economically significant will depend on the input prices of corn and tallow.