

The Effect of *Sweet Bran*[®] on the Profitability of Finishing Cattle in Cattle Town Feeders LTD – January 2004

Introduction

Sweet Bran[®] brand corn gluten feed is a wet corn milling feed product manufactured by Cargill Sweeteners North America. It is a blend of several corn milling ingredients from the production of fructose and alcohol. It has a consistent 60% dry matter level and is 22-23% protein on a dry basis. The advent of unit trains and rail car dumping systems has made this product available to feedlots in Kansas, New Mexico, Oklahoma, and Texas. Inclusion of *Sweet Bran* has typically increased feed intake, increased daily gain, and reduced ration cost resulting in increased profit per head. This study was conducted to compare the profitability of a steam-flaked corn diet containing *Sweet Bran* only in the starter to a diet containing *Sweet Bran* in both the starter and finisher under a commercial production situation.

Experimental Procedures

Facilities

The study was conducted at Cattle Town Feeders Ltd, which is located ten miles west of Hereford, Texas. Pens have pipe and cable fences, dirt floors, concrete fence-line bunks, and automatic waterers. Each pen contains a dirt mound, and there is no shade or shelter. Since pen availability was limited when the study was initiated, pens were assigned randomly across the feedlot. As pen space allowed, cattle on the study were moved to pens in a designated area of the feedlot, which minimized environmental differences as much as possible within a commercial feedlot setting.

Animals

Starting on May 7, 2003, yearling heifers arriving at the feedlot were randomly assigned to either the control or *Sweet Bran* finisher treatment by sorting every other animal as they moved down an alley. This resulted in a pair of pens for each group of heifers with equal numbers in the control and treatment replicates. This process was continued until the last group was assigned on June 1, 2003. A total of 5,970 heifers were allotted to 21 pairs of pens. The number of heifers per pen ranged from 66 to 220 head. Most of the heifers had been grazing wheat pasture before arrival. Average initial weight was 720 lb, and initial weights were similar for each pair of pens. Heifers used in this study were predominantly of British breeding with approximately 25% of the

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heifers having some continental breeding (primarily Charolais) and 15-20% of the heifers having some percentage of Brahman breeding. The heifers were fed for an average of 158 days.

Experimental Design

One pen from each pair was assigned to the control treatment and the replicate assigned to the *Sweet Bran* finisher treatment (Table 2) that contained 20% *Sweet Bran* (DM Basis). These pen replicates were then treated as similarly as possible throughout the feeding period. During the trial, changes in the control finisher diet were made due to changes in ingredient prices. In addition, in the fall, the level of corn silage was increased in the control diet as a standard pre-winter program. The control supplement was also modified to adjust for changes in ingredient prices (Table 3).

At processing, each heifer was administered a respiratory disease vaccine (Reliant 4, Merial), a 7-way clostridial bacterin-toxoid vaccine (Vision 7 Way, Intervet), an Autogenous Bacterin (American Animal Health), and treated for parasites (Ivomec Plus, Merial). The implant regime for each pair of pens was based on the initial weight, estimated final weight, and anticipated number of days on feed. The most common implant program was a Ralgro as the initial implant followed by a Revalor H approximately 60 days later. The largest heifers at arrival were implanted with Revalor H at arrival and not reimplanted. A couple of pens were implanted at arrival with Component EH followed by a Revalor H approximately 70 days later.

Feeding Procedures

Heifers assigned to both treatments were initially fed the same starter diet (Table 1) containing 22.6 % *Sweet Bran* (DM Basis). Starting approximately 7 days after arrival, a step-up program was initiated whereby a blend of the starter ration and the final finishing ration for each treatment was fed. The percentage of the final finishing ration was gradually increased during this step-up period. By day 25, all cattle were fed the appropriate finishing ration. Heifers pulled and placed in the hospital were fed the starter diet that contained *Sweet Bran*.

Feedbunks were evaluated at 8 p.m., 1 a.m., and 5 a.m. Pens with clean bunks at 8 p.m. were increased 1 lb of DM per head. Pens clean at 1 a.m. were increased .5 lb of DM per head. Towards the end of the trial, the requirements for an increase in delivery were changed whereby pens had to be clean at 1 a.m. for two consecutive days before feed delivered was increased .5 lb per head. Correspondingly, delivery amounts were reduced in pens with feed remaining at the initial feeding (approximately 6 a.m.).

Feed was delivered to each pen using a truck equipped with load cells. The amount delivered was recorded and entered into a computerized recordkeeping system. Diets were fed in three equal feedings at approximately 6 a.m., 11 a.m., and 3 p.m. daily.

Marketing

Cattle deemed to have sufficient condition based on visual appraisal by an experienced feedlot employee were sorted from each pen and sent to slaughter. The same number of heifers was sent from both pens of a replicate at each marketing time. Cattle were sent to slaughter in 2 to 4 sorts depending on the variability in condition, breed type, etc., in the pen. Groups sorted for slaughter from pen replicates were handled similarly. Group weights from replicates were taken as close to the same time as possible. A 4% pencil shrink was applied to establish final weight.

Carcass Data Collection

All cattle were slaughtered at the Excel plant, Friona, Texas. USDA graders assigned quality and cutability grades after carcasses had chilled for 48 hours. Dressing percentage for each pen was calculated as the mean hot carcass weight / mean shrunk live weight X 100.

Economic Analysis

To analyze the profitability of the cattle, a value of \$79 per cwt was assigned as the delivery cost of the heifers. Correspondingly, an average sale price of \$95 per cwt was used as the value at slaughter. Since comparison pens arrived at the same time and averaged the same number of days on feed, using these average prices for comparison seems valid.

Feeding costs were based on the actual feed and non-feed costs charged by the feedlot. During the study, the price of *Sweet Bran* averaged 99.8% of the price of dry corn and 92.2% of the price of steam-flaked corn on a DM basis. Profitability was calculated with "deads out".

Statistical Analysis

The data were analyzed using a paired t-Test with 21 pairs of observations.

Results

Performance

Intakes, gains, and conversions (Table 4) showed the same trends as observed in previous research when *Sweet Bran* replaced steam-flaked corn in finishing diets, but the magnitude of response varied (1,2,3,4,5). Dry matter intakes were increased ($P = .002$) by an average of 4.3%, which is slightly lower than previous research (5 to 6%). Gain was increased ($P = .01$) by 2.6%, which also is slightly lower than previous studies (4 to 5%). The cattle fed the *Sweet Bran* finisher treatment gained an average of approximately 11 more pounds than the cattle fed the control treatment. The lower response in intake and gain by the *Sweet Bran* finisher treatment may be attributed to the inclusion of *Sweet Bran* in the starter and step-up rations of the control treatment. In previous research, *Sweet Bran* would not have been fed at any time in the control rations. The additional gain observed in this study indicates that total energy intake was higher

in the *Sweet Bran* finisher treatment. This is in general agreement with previous research. As a result of the smaller difference in daily gain between treatments, feed conversion was slightly (1.9%) improved for the control treatment ($P = .10$).

Death loss was higher ($P = .03$) in the control treatment than in the *Sweet Bran* finisher treatment (Table 6). A trend for lower death loss was also observed in two other feedlot scale research trials (4,5). *Sweet Bran* has been shown to increase pH levels in the rumen compared to diets with higher levels of corn, which may have contributed to the reduction in death loss. In addition, animals challenged by respiratory infection have lower and possibly more erratic feed intakes. *Sweet Bran* may reduce the stresses associated with low and erratic feed intake patterns and assist animals to overcome the challenge of respiratory infection.

Carcass Characteristics

Dressing percentage ($P = .72$), percent Choice ($P = .83$) and average yield grade ($P = .82$) were similar for the control and *Sweet Bran* finisher treatments (Table 7). Hot carcass weights were heavier ($P = .02$) for the *Sweet Bran* finisher treatment resulting from the increased daily gain.

Economics

The *Sweet Bran* finisher ration averaged \$5.31/ton of DM lower cost than the control ration (Table 5). This reduction in cost resulted from replacement of higher cost ingredients, i.e., steam-flaked corn and corn steep liquor with *Sweet Bran*. Additionally, the cost per ton and inclusion level of the finishing supplement were reduced by taking advantage of the protein in *Sweet Bran*. This reduction in cost per ton of dry matter is in general agreement with previous research (1,2,3,4,5).

Heifers on the *Sweet Bran* finisher treatment were 1.6 lb lighter at the start of the trial, which meant that they were valued at \$1.20 less per head at \$79/cwt. Heifers fed the *Sweet Bran* finisher treatment were 9.1 lb heavier ($P = .03$) at slaughter, which resulted in an additional \$8.69 in revenue at \$95/cwt (Table 5). The heifers on the *Sweet Bran* finisher treatment fed for \$.75 less per cwt of gain than the control heifers because of lower ration cost per ton of dry matter and the additional gain. The added gain (10.7 lb) and reduced ration cost per ton (\$5.31 per ton) resulted in an average of \$7.04 more profit ($P = .04$) per head for the heifers on the *Sweet Bran* finisher treatment. Of the 21 pairs of pens, the *Sweet Bran* pen was more profitable in 17 of the comparisons. The annual return for Cattle Town Feeders, feeding approximately 80,000 head per year, would equate to additional revenue of approximately \$560,000 per year.

Summary

Under feedyard conditions, feeding *Sweet Bran* in the starter, step-up, and finishing diets, increased profitability compared to feeding *Sweet Bran* only in the starter and step-up diets. The increased profit resulted not only from additional gain but also from a lower cost of gain. *Sweet*

Bran had no impact on carcass characteristics except to increase carcass weight as a function of additional daily gain. This means that *Sweet Bran* would have increased profitability whether the cattle were sold on a live or carcass basis.

References

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Table 1. Composition of the Starter Diet (DM Basis)

Ingredient	Concentration
Steam-flaked Corn	27.6
<i>Sweet Bran</i> [®]	22.6
Cottonseed Hulls	36.2
Starter Supplement	12.3
Micro Supplement	.001
Tallow	1.3
Calculated Composition, DM Basis	
Dry Matter, %	74.7
NEm, Mcal/lb	.76
NEg, Mcal/lb	.47
Crude Protein, %	14.87
NPN, %	1.51
Ether Extract, %	3.91
Crude Fiber, %	21.47
Calcium, %	.90
Magnesium, %	.25
Phosphorus, %	.45
Potassium, %	1.50
Sulfur, %	.19
NDF, %	40.88

Table 2. Average Composition of Finishing Diets (DM Basis)

Ingredient^a	Control^b	<i>Sweet Bran</i>[®] Finisher^b
Steam-flaked Corn	76.4	62.1
Corn Silage	8.3	8.0
Corn Steep Liquor	3.3	0
Finishing Supplement	6.9	5.9
Tallow	4.4	3.9
Cotton Seed Hulls	.7	0
<i>Sweet Bran</i>	0	20.1
Calculated Composition		
Dry Matter Basis		
Dry Matter, %	67.7	66.0
NEm, Mcal/lb	1.01	.98
NEg, Mcal/lb	.68	.66
Crude Protein, %	13.37	14.07
NPN, %	3.69	2.89
Ether Extract, %	7.77	7.11
Crude Fiber, %	4.94	5.64
Calcium, %	.70	.70
Magnesium, %	.18	.20
Phosphorus, %	.37	.43
Potassium, %	.66	.70
Sulfur, %	.18	.15
NDF, %	4.41	11.10

^a A micro-ingredient package was added to all rations at approximately 0.03% of ration dry matter. This package was formulated to supply 280 mg Rumensin, 78 mg Tylan, 40,000 IU Vitamin A, 500 IU Vitamin E, and .4 mg MGA per day.

^b Rations shown are the weighted average of the rations used during the trial based on the number of days that each ration was fed.

Table 3. Composition of Supplements (As Fed)

Ingredient ^a	Control	Control	<i>Sweet Bran</i> [®]
	5/7 to 7/14	7/15 to End	Finisher 5/7 to End
Cottonseed Meal	30.8	15.1	0
Wheat Middlings	16.6	35.1	50.3
Urea	16.2	15.9	15.5
Limestone	24.2	23.6	26.7
Salt	3.6	3.4	4.0
Potassium Chloride	3.1	1.8	1.7
Ammonium Sulfate	3.6	3.4	0
Magnesium Oxide	0.8	0.6	0.5
TM Premix	1.1	1.1	1.3
Nutrient Analysis			
Dry Matter Basis			
Dry Matter, %	94.1	93.6	93.5
NEm, Mcal/lb	.36	.41	.43
NEg, Mcal/lb	.24	.26	.27
Crude Protein, %	69.5	64.9	54.9
NPN, %	53.4	52.7	46.8
Calcium, %	9.8	9.57	10.8
Phosphorus, %	.50	.53	.54
Magnesium, %	.74	.62	.56
Potassium, %	2.43	1.71	1.61
Sulfur, %	1.06	1.01	.11
Salt, %	3.77	3.64	4.23

^aActual ingredients used to make the supplements varied during the trial as a result of least cost formulations. Ingredients shown represent those used in the initial batch.

Table 4. Cattle Performance, live weight (4% shrink) basis

Item	Control	<i>Sweet Bran</i> [®] Finisher	Diff.	% Diff.	P Value
Dry Matter Intake, lb/day	17.40	18.15	0.75	4.3	.002
ADG, lb	2.72	2.79	.07	2.6	.01
Feed Conversion, F/G	6.40	6.52	-.12	-1.9	.10

Table 5. Profitability Analysis

Item	Control	<i>Sweet Bran</i> [®] Finisher	Diff.	P Value
Feed Cost* Per cwt of Gain, \$	56.34	55.54	-.80	.20
Total Cost Per cwt of Gain, \$	59.03	58.29	-.75	.24
Average Final Weight, lb	1152.4	1161.6	9.2	.03
Average Sale Value @\$95/cwt, \$	1094.81	1103.49	8.69	.02
Average In Weight, lb	721.0	719.4	-1.6	.53
Average Value In @\$79/cwt, \$	569.55	568.35	-1.20	.52
Total Feeding Cost Per Head, \$	254.53	257.38	2.85	.36
Average Profit Per Head, \$	270.73	277.77	7.04	.04

Table 6. Health Data

Item	Control	<i>Sweet Bran</i> [®] Finisher
Died		
Respiratory, n	24	16
Digestive, n	5	2
Misc., n	2	0
Total death loss, n	31	18
% of initial number	1.0	0.6*
Average Medicine Cost, \$/hd	1.39	1.65

* Difference in death loss statistically significant (P = .03)

Table 7. Carcass Characteristics

Item	Control	<i>Sweet Bran</i> [®] Finisher	P Value
Dressing Percentage	65.1	65.0	.72
Hot Carcass Weight, lb	749.7	755.5	.02
Choice Percentage	57.2	56.8	.83
Select Percentage	39.5	40.8	.43
No Roll Percentage	3.3	2.4	.17
Percentage # 4s	5.9	6.1	.81
Average Yield Grade	2.5	2.5	.82