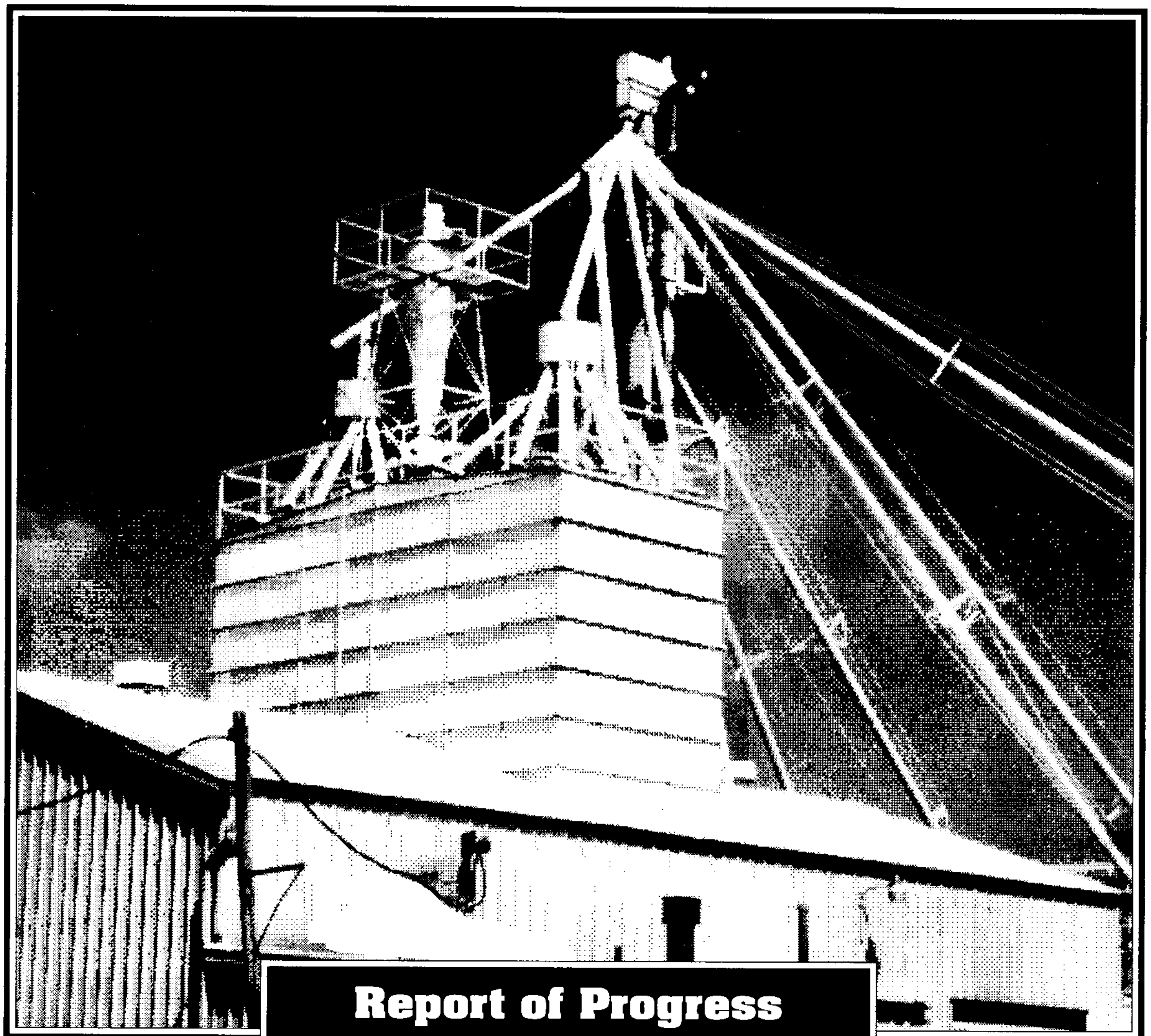
CATTLE FEEDERS' DAY 1992



Report of Progress 659

Agricultural Experiment Station
Kansas State University, Manhattan
Walter R. Woods, Director

SOUTHWEST RESEARCH-EXTENSION CENTER

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KANSAS STATE UNIVERSITY
Southwest Kansas Research-Extension Center
Garden City

1992 Cattle Feeders' Day
Report of Progress

General Procedures for Feeding Trials

Unless otherwise specified in individual reports contained herein, the following represent standard operating procedures for experiments reported.

Animal Receiving and Processing:

Cattle were individually weighed and ear-tagged immediately upon arrival. Processing, which occurred 24 to 48 hours later, consisted of implanting and treatment for endo- and ectoparasites with a de-wormer drench or injectable and pour-on insecticide, respectively. Animals were vaccinated against IBR, BVD, PI_3 (modified-live vaccine), and BRSV in combination with five strains of *Leptopomona* and(or) *Haemophilus somnus* and injected with a 7-way clostridial bacterin. Revaccination was performed approximately 14 days after initial vaccination against respiratory diseases with the lepto combinations. Horns were tipped and(or) removed to poll and castrations were performed as needed.

Animal Weights and Slaughter:

Initial weights, except where specifically stated, were off-truck weights adjusted to pay weight. Interim weights to monitor trial progress were single-day, individual, early morning, 'full live' weights taken approximately every 28 days. Final full live weights were obtained on 2 consecutive days. Animals were generally shipped and slaughtered on the same morning that the second, final, full live weight was taken. Liver abscess and hide pull scores were taken at slaughter. Carcass data were obtained following a 24-hour chill.

Animal Feeding:

All cattle were fed once daily from a truck-mounted mixer-feeder equipped with programmable scales and printers. Generally, cattle in a finisher trial were stepped-up to a final diet within 14 days. Steam-flaked grains and rolled grains were processed through an 18 X 24 inch Ross roller mill. Intended flaking densities for milo, corn, and wheat were 26, 28, 39 lbs/bu, respectively. Micro-ingredients were added to the daily ration at mixing by way of a computer-operated, automatic flushing, weigh machine.

EFFECTS OF ASPERGILLUS ORYZAE (MSE) ON THE PERFORMANCE OF TRANSIT-STRESSED BEEF STEER CALVES

by

A. S. Freeman and B. W. Walter[1]

SUMMARY

Two-hundred, light-weight (avg wt 538 lbs), transit-stressed calves of mixed breeding were used to evaluate the effects of Aspergillus oryzae (MSE) addition to a receiving diet on feedlot performance and health during a 33-day receiving trial. Cumulative dry matter intake was not affected by treatments. Average daily gain was 4.2% faster (P = .6822) for MSE calves than for CON calves. Cumulative feed conversion for MSE calves was improved 6.5% (P = .1659) compared with CON calves. Percents morbidity, mortality, and chronically sick calves were not affected by treatments. However, the MSE calves required almost 1 day more of medical treatment than the CON animals. The data from this study suggest that MSE added at 1 lb per 20,000 lbs live body weight was not effective for the entire study period (33 days). But for the first 20 days, MSE appearred to be beneficial in improving the performance of these transit-stressed calves.

INTRODUCTION

Several enzyme extraction products have been used as feedstuff additives or adjuvants for the past 40 years. These adjuvants have been shown to improve efficiency of production by either enhancing diet digestibility and(or) increasing dry matter intake. In ruminants, two possible mechanisms have been indicated: 1) added microbials and extracts of microbial fermentation may allow favorable microorganisms to proliferate in the rumen, thus ameliorating ruminal fermentation or 2) these 'probiotics' may have the same effect on favorable microorganisms in the lower gut, thus improving the health of the intestinal tract lining and allowing for improved nutrient absorption. These two mechanisms may work in concert. If so, the end result would be the same - improved animal performance.

Maximum Stablized Enzyme (MSE) consists of Aspergillus oryzae fermentation products, corn distillers grain, dried grains, dried molasses, methionine hydroxy analogye, calcium propionate, L-lysine, processed grain by-products, vitamin E supplement, D-activated plant sterol, vitamin B-12 supplement, dextrin, and malt yeast. For receiving calves, the recommended feeding rate is 1lb MSE for every 20,000 lbs of live body weight (22.7 mg/lb). As the animals move into subsequent feeding stages, this rate is decreased to 1lb of MSE per 40,000 lbs live body weight (11.35 mg/lb). This product does not contain live microbes. The MSE is mixed directly into the ration like any other powder ingredient.

Results from many microbial additive studies have been conflicting. Animals stressed either by transit or management stressors such as weaning or both appear to respond more consistently to these microbial adjuvants. Therefore, this study was designed to evaluate the effects of MSE on the performance of newly received, transit-stressed, beef calves.

OBJECTIVE

To determine effects of adding MSE directly to the diet of transit-stressed calves on 1) dry matter intake, average daily gain, and feed conversion and 2) morbidity and mortality.

PROCEDURE

General. The treatments were:

1) **CON**trol - Receiving Diet with no added MSE.
2) **MSE** - Receiving Diet with MSE added at a rate of 1 lb per 20,000 lbs live body weight or 22.7 mg per lb live body weight.

Two hundred, crossbred, beef type calves with averaged weight of 538 lbs were randomly allotted by frame score, breed-type, and body condition to 20 pens with 10 head each. Calves were sorted and allotted based on visual inspection and weight at arrival or within 24 hours. Cattle were sorted into respective pens and placed on trial during the second consecutive weigh day. Each treatment included 10 pens with five pens for each weight block within a treatment. The calves were not implanted during the receiving trial.

Weighing. Upon arrival, all calves were processed within 24 hours. Calves were received over 3 days from southwest area auctions. Individual weights were obtained at processing and on the following day. An average of two consecutive weigh-day weights was used for initial trial starting weight. Period weights were taken on days 9 and 20, and final weights on days 33 and 34, for two consecutive weigh-day weights. The trial ended on day 33. Cattle weights were taken after the morning bunk call just before feeding. Feed and water were not withheld before weighing. Period and cumulative weight gains and average daily gains were calculated from these individual weights.

Feeding and Diets. Upon arrival, cattle were given access to fresh water, and a milled concentrate ration with baled bromegrass hay was offered free choice in the bunks for 7 days. Diets and step-ups are given in Table 1. Decoquinate was fed daily at 180 mg per head daily for the receiving period. Vitamins A, D, and E were also fed continuously. All micro-ingredients (coccidiostat and vitamins) were added to feed batches by a micro-ingredient weigh machine. Daily feed intake was determined from the amount fed on previous day in the morning. Calves were fed an ad libitum with minimal accumulation of feed. Period and cumulative daily dry matter intakes per calf and feed conversion were calculated from daily intake records and weekly dry matter determinations on diets.

Medication Regime. Calves were determined as healthy or requiring treatment by visual appraisal daily. Those calves requiring medical treatment were removed from their pen and individually weighed; their rectal temperatures were then taken; then they were medicated, identified, and returned to their original pen. This process was repeated until the calf recovered or was determined to be a chronic. This determination was made by visual appraisal and after 8 consecutive days of unsuccessful medical treatment, as indicated by no weight gain, non-responsive rectal temperature, and poor condition. All chronics were removed from the trial and placed in a cull pen. Medical treatment regimes are given in Table 2.

Percent morbidity and mortality were calculated as the number of calves requiring medical treatment and the number of dead calves, respectively, divided by the initial number of calves within that treatment then multiplied by 100. Average sick days per morbid calf within a treatment were calculated as the sum of sick calves multiplied by the total sick days, then divided by the total number of medicated calves. Percent re-treats were the number of previously medicated calves divided by the total number of medicated calves within a treatment then multiplied by 100. Medical cost per morbid calf was calculated as total medication costs divided by number of medically treated calf. Average treatment medical cost per calf was calculated as total medication costs divided by number of surviving calves within a treatment.

Table 1. Ingredient composition and nutrient analysis for MSE diets during the receiving period - 33 days.

ITEM	DIETARY STEP-UPS Initial	Step-I	Step-II
Days of Feeding	7	17	9
	—— Dry Matter Basis, % ——		
Ingredients			
Alfalfa Hay	40.3	29.9	19.8
Corn Silage	4.9	6.4	9.2
Dry-Rolled Corn	31.3	39.1	45.7
Dry-Rolled Milo	10.9	12.6	14.5
Blended Molasses	5.1	3.6	2.5
Pelleted Supplement	5.8	6.1	6.0
Blood Meal	1.7	2.3	2.3
Bromegrass Hay[a]			
Micro-ingredients[b]			
Nutrient Analysis			
Dry Matter	81.40	80.16	77.86
TDN	66.95	70.99	74.69
Crude Protein	15.59	15.51	14.83
Acid Detergent Fiber	14.94	12.49	10.37
NEm, Mcal/cwt	72.16	76.82	81.23
NEg, Mcal/cwt	44.68	48.80	52.72
Calcium	1.22	1.11	.96
Phosphorus	.33	.33	.33
Magnesium	.19	.18	.16
Potassium	1.71	1.48	1.24
Zinc, ppm	75.41	80.85	81.25

[a] Bromegrass hay was fed free choice in the bunks for 7 days. Dry matter, 78.2%; crude protein, 6.0%; ADF, 41%; NEm, 50 Mcal/cwt; NEg, 25 Mcal/cwt; potassium, 1.34%, Ca, .59%; P, .06%, magnesium, .11%.
[b] Micro-ingredients were: Decoquinate, 180 mg/head/d; vitamin A-D500, 60,000 IU/head/d; vitamin E, 400 IU/head/d. All micro-ingredients delivered by a Micro-Weight Machine.

Table 2. Medical treatment regimes for MSE receiving trial.

PHARMACEUTICAL	REGIMES[a] A	B	C	D[b]
	- - - - - mg/lb - - - - -			
Erythromycin	2			
Tylosin	8			
Spectinomycin		6		
Sulfadimethoxine		25		
Ceftiofur			0.5	
Oxytracycline				9
Sulfamethazine				90

[a] Medication regimes were given for 3 consecutive days, then calf was returned to pen if it was responding to treatment as indicated by (1) a drop or return to normal rectal temperature, (2) increase or steady weight gain, and (3) improved condition visually. If no improvement was evident in all three areas, calf was moved to the next regime on the third day of treatment. This was repeated, if necessary, until the non-responsive calf reached regime C (a total of 6 medication days).
[b] Calf was given this regime once and returned to a cull pen, thus removing it from the study. Cull calves were further medicated as needed to restore health.

RESULTS AND DISCUSSION

Dry Matter Intake. All period and cumulative feedlot performances are given in Table 3. Period and cumulative dry matter intake was not affected (P > .10) by the MSE treatment. However, the MSE calves' intake was increased 3.5% and 10.2% on day 8 and 18 of the receiving period, respectively, compared to CON intake. On day 33, MSE intake was depressed 6.4% compared to CON. Cumulative intake, after 19 days on feed, was 7.7% greater for the MSE calves compared to the CON calves intake. Overall, cumulative dry matter intake (33 days on feed) by MSE calves was 2.6% than intake by CON calves.

A treatment by day interaction was noted for daily dry matter intake (P < .0001). But treatment did not affect (P > .10) intake. Apparently MSE stimulated intake (Figure 1.) for the first 23 days of the receiving period. Regression lines were calculated from these data by regressing daily intake across receiving period days. The slopes of these regression lines or rates of daily dry matter intake were not different (P > .10). If both the CON and MSE regression lines are solved for an intake equivalent to 2% of the body weight of a 566 lb calf (11.34 lb), the CON calves required 3 days longer to reach that level of intake compared with the MSE calves.

Table 3. Period and cumulative feedlot performance for CON and MSE calves during the receiving trial.

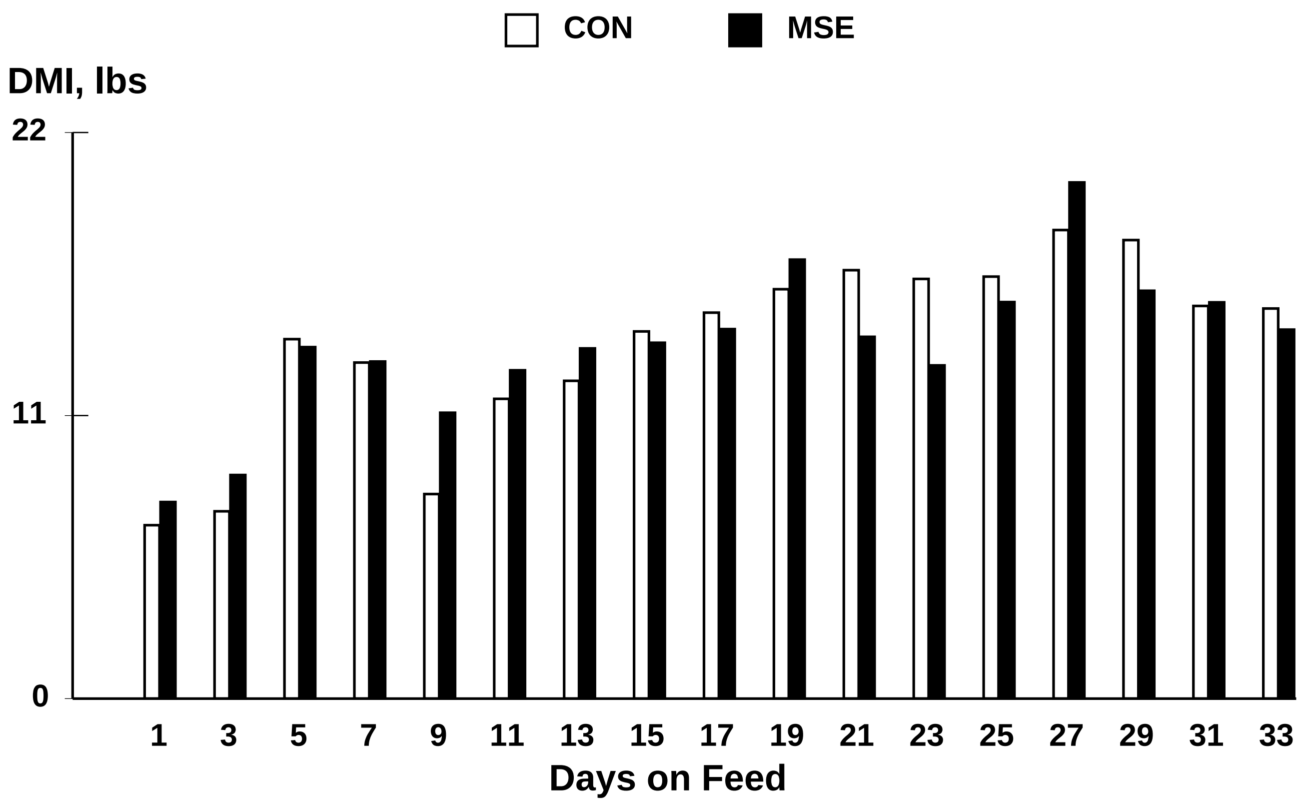
ITEM	TREATMENTS CON	MSE	SEM[a]	PERCENT OVER CON
No. of Calves	96	98		
Period				
DMI, lbs				
Day 8	11.17	11.57	.64	+ 3.58
Day 18	12.79	14.09	.81	+ 10.16
Day 33	16.53	15.48	.70	- 6.35
ADG, lbs				
Day 8	0.99	1.21	.47	+ 22.22
Day 18	2.31	3.01	.37	+ 30.30
Day 33	2.03[b]	1.58[c]	.17	- 22.17
F/G				
Day 8	5.15	4.10	1.57	+ 20.40
Day 18	5.00[c]	4.00[b]	.81	+ 20.00
Day 33	7.40[b]	9.41[c]	1.56	- 27.16
Cumulative				
DMI, lbs				
0 - 18 d	12.14	13.08	.67	+ 7.74
0 - 33 d	14.48	14.11	.65	- 2.56
ADG, lbs				
0 - 18 d	1.77	2.30	.32	+ 29.94
0 - 33 d	1.91	1.99	.19	+ 4.19
F/G				
0 - 18 d	6.86[c]	5.69[b]	.70	+ 17.06
0 - 33 d	7.58	7.09	.59	+ 6.46

[a] SEM = Standard error of the treatment mean.
[bc] Treatment means are different, P < .1000.

Average Daily Gain. Average daily gain for the first 8 days was not affected (P > .10) by treatments. On day 18, the MSE calves were gaining 30.3% more weight (P = .1977) compared to the CON calves. However, on day 33, the CON calves were gaining 22.2% more (P < .0766) than the MSE calves. Cumulative ADG for 18 days was improved 30% (P = .2588) for the MSE group compared with the CON calves. But, by 33 days, no treatment differences (P = .6822) occurred in cumulative ADG. Rate of gain was 4.2% faster (P = .6822) for MSE calves by the end of the receiving period than by CON calves.

Feed Conversion. Feed conversion was analyzed as lbs of gain per lb of dry matter consumed, but will be reported as intake to gain ratio. During

Figure 1. Daily dry matter intake for CON and MSE beef calves during receiving period.



the first 8 days, the MSE calves converted 20.4% more (P = .1889) feed to live weight gain. Gains made during this time were probably entirely fill and not tissue gains. By day 18, the MSE group was still maintaining a 20% improvement (P < .0446) in conversion compared with the CON calves. However, by day 33, the CON animals were converting 27.2% more (P < .08) feed to live weight gain. Cumulative conversion at 18 days on feed was 17.1% more (P < .0066) for the MSE calves. At 33 days of cumulative feed conversion, the MSE group was converting 7.09 lb of dry matter to 1 lb of gain compared to 7.58 for the CON calves. This was an 6.5% improvement (P = .1659) in feed to gain ratio.

Health. The number of calves pulled and requiring medical treatment was not affected by treatments (Table 4; P =.4956).

Morbidity was 23% for the CON calves and 28% for the MSE group. One calf died in the CON treatment, for a mortality rate of 1%. All MSE calves survived. In the CON group, three (3%) calves were removed from the study as chronics. Two calves were removed from the MSE for a 2% chronic incidence. Of the 23 CON calves medicated, 47.8% responded to the first medication regime; thus, 52.2% required retreating. Only 25% of the medicated MSE calves responded to first medication regime. Total sick days were not affected by treatments (P = .4606); 110 and 154 for the CON and MSE treatments, respectively. Average sick days were different (P < .0402) for the CON group (4.8 days) compared with the MSE calves (5.5 days). The medication costs per medically treated calf were $13.49 for CON and $16.43 for MSE. However, the total nonfeed cost during the recurring period was $11.14 per CON calf and $6.97 per MSE calf.

TABLE 4. Health characteristics for CON and MSE calves during the receiving trial - 33 days.

ITEM	TREATMENTS CON	MSE
Number of Calves Treated	23	28
Total Medication Days	110	154
Avg Medication Days	4.8[a]	5.5[b]
Percent Morbidity, %	23	28
Percent Chronics, %	3	2
Percent Mortality, %	1	0
Percent Response to First Treatment, %	47.8	25.0
Percent Retreats, %	52.2	75.0
Medication Cost, $	269.76	410.85
Non-medication Cost, $	40.48	49.28
Total Cost, $	310.24	460.13
Total Medication Days, d	110	154
Avg Medication Days, d	4.78	5.50
Avg Daily Medication Cost, $	2.82	2.99
Total Cost per Calf, $	13.49	16.43
Avg Cost per Surviving Calf, $	3.23	4.70
Processing Charge per Calf, $	2.27	2.27
Dead's Value per Survivors, $	5.64	0
Non-feed Total Cost per Calf, $	11.14	6.97

[ab] Treatment means are different, P < .0402.

CONCLUSIONS

Cumulative dry matter intake (33 days on feed) was not affected by treatments. However, the CON calves required 3 days longer to reach a dry matter intake equivalent to 2% of body weight compared with the MSE calves. This reduction in days to achieve normal intake was not statistically significant. The MSE calves' rate of gain was 4.2% faster (P = .6822) by the end of the receiving period compared with the CON group. The MSE calves' cumulative feed conversion was 6.5% better (P = .1659) compared with the CON calves. Percents morbidity, mortality, and chronic calves were not affected by treatments. However, the MSE calves required almost 1 (0.7) day more of medical treatments compared with the CON animals. Generally, a 4% difference in a treatment comparison as investigated in this study could be economically important, if and only if, the treatments are statistically different. Product price will control whether the difference is less than or greater than 4%. Therefore, this study indicates that the MSE product added at 1 lb per 20,000 lbs live body weight was not effective for the entire study period (33 days). But for the first 20 days, MSE appeared to be beneficial in improving the performance of these transit-stressed calves.

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EFFECT OF GRAIN SORGHUM PROCESSING AND TEST WEIGHT ON THE PERFORMANCE AND CARCASS MERIT OF FEEDLOT BEEF STEERS

by

A. S. Freeman, K. K. Kreikemeier[1], and G. L. Kuhl[2]

SUMMARY

A 124 d finishing trial with 179 steers (average weight of 874 lbs) was conducted to evaluate the relative feeding value of 35, 45, and 55 lbs/bu grain sorghum processed by either dry-rolling or steam-flaking. Dietary treatments were: dry-rolled sorghum (DRM35, DRM45, and DRM55) and steam-flaked sorghum (SFM35, SFM45, and SFM55). Cumulative dry matter intake was depressed 6.7% by steam-flaking compared with dry-rolling. An interaction between test-weight and grain processing was present at the end of the trial. Dry matter intake was similar for all dry-rolled test-weights of sorghum. The SFM35 and SFM45 dry matter intakes were similar to the DRM35 intake. The SFM55 intake was depressed 10.4% compared with the other treatments. Average daily gain decreased linearly as test weight increased during the first 28 days. However, after 124 days, no treatment effects were present for average daily gain (average of 2.95 lbs). Steers receiving steam-flaked sorghum converted 10.2% more feed to live-weight gain compared with those receiving dry-rolled sorghum. An interaction was evident for cumulative feed conversion by 124 days on feed. Cumulative feed conversion for the dry-rolled treatments were similar. DRM35, SFM35, and SFM45 steers had similar conversions, also. However, SFM55 steers converted 10.8% more feed to live-weight gain compared with the average of the other treatments. Carcass characteristics were not affected by sorghum test-weight. But steam flaking increased ribeye area, back fat thickness, and improved quality grade. Relative feeding value of dry-rolled, low test-weight sorghum was comparable to that of normal sorghum; however, steam-flaking improved the relative feeding value of 'normal' test-weight sorghum above that of lower test-weight sorghum. Steam-flaking lowered the cost of gain for all test-weights of sorghum.

INTRODUCTION

This study is a continuation of the low test-weight sorghum grower trial presented in the 1991 Cattle Feeders' Day, Report of Progress #632. After the growing phase, the steers were moved into a 124-day finishing phase.

OBJECTIVES

1) To compare the relative feeding value of three test-weights of grain sorghum in a standard finishing trial using yearling beef steers.

2) To determine sorghum test-weight effects on feedlot performance and carcass merit.

3) To determine whether grain processing, dry-rolled or steam-flaked, affects the relative feeding value of the sorghums.

4) To determine if there is any interaction between sorghum test-weight and grain processing in affecting animal performance and carcass merit.

PROCEDURE

After the grower phase, 180 steers (average weight of 874 lbs) were fed a similar diet during a 14 day equalization period. Then, steers were randomly assigned to one of six treatments: dry-rolled grain sorghum (DRM35, DRM45, and DRM55), or steam-flaked grain sorghum (SFM35, SFM45, and SFM55). Each treatment included 30 steers with six head in each of five pen replicates. One steer was removed from the SFM55 treatment after the first 28-day weigh period because of poor performance.

Final finishing diet composition and nutrient analysis are given in Table 1. Cost per 100 lbs of diet is also given. The steam-flaked diet costs were adjusted for the added cost of steam-flaking each of the grain sorghums. Cattle were stepped-up within 2 weeks to a final level of 280 mg monensin and 90 mg of tylosin per head daily. The steers were full fed once daily in the morning. The steers were initially implanted with Compudose during the grower phase. After 56 days on feed during the finishing phase, all steers were implanted with Synovex-S and Finaplix-S in opposite ears.

Table 1. Percent dry matter composition and nutrient analysis of finishing diets with cost per hundred weight by treatments.

	TREATMENTS					
PROCESSING	Dry-Rolled			Steam-Flaked		
ITEM TEST-WEIGHTS	DRM35	DRM45	DRM55	SFM35	SFM45	SFM55
Grain Sorghum	79.8	78.5	77.9	79.8	78.2	77.6
Corn Silage	11.2	10.3	10.0	11.7	10.5	10.0
Molasses	1.7	1.6	1.4	1.8	1.8	1.7
Tallow[a]	4.1	4.1	4.1	4.1	4.1	4.1
Supplement	3.2	5.6	6.5	2.6	5.4	6.6
Crude Protein	13.3	13.2	13.2	13.5	13.5	13.5
NEm, Mcal/cwt	97	103	107	101	107	110
NEp, Mcal/cwt	63	69	73	65	72	75
Cost/cwt, $[b]	3.41	3.78	3.85	3.56	3.93	4.03

[a] Special Tallow, Qual-Fat™. Donated by National By-Products, Garden City, KS.
[b] Cost adjusted for steam-flaking.

RESULTS AND DISCUSSION

Dry Matter Intake. The main effect of processing (P < .10.) on dry matter intake was present for 93 days on feed (Table 2.). During the first 28 days, steam-flaking depressed dry matter intake by 4.32%. By 58 days on feed, cumulative intake was depressed 5.97% by the steam-flaking process. Intake was further depressed (8.2%) by steam-flaking the sorghum grain compared with dry-rolling after 93 days on feed. An interaction between test-weight and grain processing was present at the end of the trial. Dry matter intake was similar for all test-weights of sorghum that were dry-rolled (average of 21.6 lbs). Dry matter intakes of SFM35 and SFM45 were similar to intake of DRM35. The SFM55 intake was depressed 10.4% compared with the other treatments.

Average Daily Gain. During the first 28 days, as test weight increased, average daily gain decreased in a linear manner (Table 2.). By 93 days on feed, a quadratic response was evident for cumulative average daily gain. However, after 124 days, no treatment effects were present for average daily gain (average of 2.95 lbs).

Feed Conversion. During the first 28 days, as test weight increased, feed conversion decreased (P < .05) in a linear manner (Table 2.). Feed conversion was enhanced (P < .10) by steam-flaking by 10.3, 7.3, and 12.1% at 28, 58, and 93 days on feed, respectively. An interaction was evident (P < .05.) for cumulative feed conversion by 124 days on feed. Cumulative feed conversion for the dry-rolled treatments were similar. DRM35, SFM35, and SFM45 steers had similar conversions, also. However, SFM55 steers converted 10.8% more feed to live-weight gain compared with the average of the other treatments.

Carcass Merit. Sorghum test weight did not affect carcass characteristics (Table 3.). However, steam-flaking did increase rib-eye area by 5.5% and back fat thickness by 11.8% and improved marbling score by 3.7%. The average hot carcass weight was 785 lbs; dressing percent, 65.0%; KPH, 2.85%; back fat, .51 in.; REA, 13.25 sq. in.; marbling score, 5.23; yield grade, 3.10; and percent cutability, 49.56%.

Cost of gain. Cost of gain was based on $3.85 for the DRM55 and $4.03 per cwt for the SFM55 diets (Table 2.). Within the dry-rolled treatments, costs of gain were $44.70 for the DRM35, $52.67 for the DRM45, and $56.12 for the DRM55 per cwt gain. The steam-flaked diets costs of gain were lower because of improved feed conversions; SFM35 was $41.93, SFM45 was $48.24 and SFM55 was $48.87. The feed efficiency of the SFM45 cattle was better than that of the SFM35 steers, accounting for the lower cost of gain for the former. Yardage, feed interest, cattle interest, etc. were not applied because they vary with each feedlot situation.

CONCLUSIONS

Cumulative dry matter intake was depressed 6.7% by steam-flaking compared with dry-rolling. An interaction between test-weight and grain processing was present at the end of the trial. Dry matter intake was similar for all dry-rolled test-weights of sorghum. The SFM35 and SFM45 dry matter intake was similar to the DRM35 intake. The SFM55 intake was depressed 10.4% compared with the other treatments. Average daily gain decreased linearly as test weight increased during the first 28 days. However, after 124 days, no treatment effects were present for average daily

Table 2. Effect of sorghum test-weight and processing on cumulative feedlot performance of yearling beef steers.

ITEM		TREATMENTS						
	PROCESSING	Dry-Rolled			Steam-Flaked			
	TEST-WEIGHTS	DRM35	DRM45	DRM55	SFM35	SFM45	SFM55	SEM[a]
No. of Steers		30	30	30	30	30	29	
Dry Matter Intake, lbs								
0 - 28 days[b]		20.17	20.50	19.99	19.24	20.05	18.75	.54
0 - 58 days[b]		20.24	20.43	20.38	19.31	19.60	18.51	.56
0 - 93 days[b]		20.79	21.30	21.16	19.77	20.02	18.89	.46
0 - 124 days[c]		21.19[de]	21.72[d]	21.85[d]	20.11[e]	20.51[e]	18.89[f]	.46
Average Daily Gain, lbs								
0 - 28 days[g]		2.78	2.83	2.55	3.04	3.01	2.75	.16
0 - 58 days		2.81	2.81	2.82	2.83	3.05	2.65	.11
0 - 93 days[h]		2.94	3.09	2.86	3.05	3.15	2.93	.09
0 - 124 days		2.95	2.94	2.88	2.95	3.03	2.96	.09
Feed Conversion								
0 - 28 days[gb]		7.25	7.23	7.88	6.36	6.66	7.29	.98
0 - 58 days[b]		7.20	7.26	7.22	6.84	6.41	6.99	.25
0 - 93 days[b]		7.07	6.90	7.42	6.48	6.35	6.24	.18
0 - 124 days[c]		7.17[de]	7.38[d]	7.60[d]	6.80[e]	6.76[e]	6.37[f]	.18
Cost of Gain, $/cwt		44.70	52.67	56.12	41.93	48.24	48.87	

[a] SEM = Standard error of treatment means.
[b] Main effect of processing, $P < .10$.
[c] Test-weight and processing interaction, $P < .05$.
[def] Treatment means are similar with alike superscripts, $P < .09$.
[g] Linear effect of test-weight, $P <.05$.
[h] Quadratic effect of test-weight, $P < .05$.

Table 3. Effect of sorghum test-weight and processing on carcass characteristics of yearling beef steers.

ITEM		TREATMENTS						
	PROCESSING	Dry-Rolled			Steam-Flaked			
	TEST-WEIGHTS	DRM35	DRM45	DRM55	SFM35	SFM45	SFM55	SEM[a]
No. of Steers		30	30	30	30	30	29	
Initial Weight, lb		867	880	873	874	872	875	26.3
Final Adjusted Wt, lb		1202	1213	1198	1208	1219	1210	31.5
Hot Carcass Weight, lb		757	788	754	785	792	786	20.5
Dressing Percent, %		64.8	65.1	64.7	64.8	64.9	65.6	.29
Rib-Eye Area, in^2 [b]		12.8	13.1	12.8	13.3	14.0	13.5	.38
Back Fat Thickness, in [c]		.48	.48	.50	.53	.54	.56	.04
Marbling Score [d]		5.02	5.25	5.14	5.26	5.38	5.34	.14
KPH Fat, %		2.77	2.77	2.80	2.87	2.95	2.92	.10
Yield		3.12	3.05	3.16	3.13	2.97	3.13	.14
Cutablilty, %		49.5	49.7	49.4	49.5	49.8	49.5	.32

[a] SEM = Standard error of treatment means.
[b] Main effect of processing, $P < .03$.
[c] Main effect of processing, $P < .07$.
[d] Main effect of processing, $P < .10$.
Marbling Score 5.00 - 5.99 = Choice Grade.

gain (average of 2.95 lbs). Steers receiving steam-flaked sorghum converted 10.2% more feed to live-weight gain compared with those on dry-rolled treatments. An interaction was evident for cumulative feed conversion by 124 days on feed. Cumulative feed conversion for the dry-rolled treatments were similar. DRM35, SFM35, and SFM45 steers had similar conversions, also. However, SFM55 steers converted 10.8% more feed to live-weight gain compared with the average of the other treatments. Carcass characteristics were not affected by sorghum test-weight. But steam-flaking increased ribeye area and back fat thickness and improved quality grade. Relative feeding value of dry-rolled low test-weight sorghum was comparable to that of normal sorghum; however, steam-flaking improved relative feeding value of 'normal' test-weight sorghum above that of lower test-weight sorghum. Steam-flaking lowered the cost of gain for all test-weights of sorghum.

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EFFECT OF AN INTRAMUSCULAR INJECTION OF LIQUAMYCIN LA-200 ON FEEDLOT PERFORMANCE OF RECEIVED BEEF STEER CALVES

by

A. S. Freeman, S. O'Neill,[1] and K. W. Maxwell[2]

SUMMARY

Two hundred forty, minimally stressed, steer calves (average weight of 668 lbs) were used to investigate the effects of an intramuscular injections either in the neck or in the round on feed consumption and performance during a 14-day receiving period. Injection of LA-200 either in the neck or round region had similar effects on feedlot performance. Calves that received the LA-200 injection in the neck actually performed better than calves injected in the round area. Regardless of injection site, LA-200 depressed final shrunk live body weight, intake, and average daily gain compared with injecting saline in the neck region. However, there was no effect on feed conversion. Visually, all calves appeared in good health, and feeding patterns were not adversely affected by any treatment.

INTRODUCTION

In 1991, the National Cattlemen's Association formed the NCA Beef Quality Assurance Task Force to monitor carcass blemishes. A survey conducted in March and July of 1991 by this Task Force found numerous injection site blemishes. The recommendation of the Task Force was for cattle processors to reduce the number of blemishes by improving aseptic processing techniques, following labeled instructions for giving medications, and moving all injections (except implanting) to the neck region. Injecting into the neck area would lessen trim from more costly primal areas of the carcass.

In a recent Texas Cattle Feeders Association newsletter (vol. XXV No. 51), a 1991 November survey of approximately 7000 top sirloins from five locations around the county indicated a significant reduction in blemishes noted earlier in the year. Dr. Gary Cowman, NCA Associate Director of Science and Technology, said, "The results are very encouraging and indicate that cattlemen have responded to Task Force recommendation aimed at reducing carcass blemishes". Another survey will be conducted in March 1992.

However, effects of injecting in the neck region pharmaceuticals that are currently being administered in the round area on the performance of newly-received cattle into a feedlot have not been explored. Therefore, this cooperative study between Kansas State University at the Southwest Research-Extension Center, Garden City, and Pfizer Animal Health was conducted.

OBJECTIVE

To determine if differences existed in feed consumption of beef steer calves given oxytetracycline (Liquamycin LA-200) intramuscularly either in the neck or in the round.

PROCEDURE

<u>Cattle.</u> Approximately 240, high quality, #1 calves with an average weight of 668 pounds and minimally stressed were used. Origin of calves was from three producers in the Morton County area of SW Kansas. All calves arrived at the SWREC on December 4, 1991. Processing and treatment allotment was performed on December 4 and 5.

<u>Processing and Treatments.</u> Calves were individually identified with ear tags, weighed, and allotted to one of the treatment groups on an "every third one through the chute" basis. Treatment allotment was done separately within each producer's lot of calves at the chute. Liquamycin LA-200 or saline was administered according to treatment group as follows:

Treatment R: Administer 9 mg/lb body weight of Liquamycin LA-200 (4.5 cc/100 lbs) intramuscularly (IM) utilizing either semi-membranous or semi-tendinous muscles of the "round" giving no more than 10 cc at any one site and splitting total dose as equally as possible between right and left sides.

Treatment N: Administer 9 mg/lb body weight of Liquamycin LA-200 (4.5 cc/100 lbs) IM high in the lateral neck just anterior to leading edge of scapula through the trapezius and serratus ventrailis into the deeper muscles of neck. No more than 10 cc were given at any one site and splitting total dose as equally as possible between right and left sides.

Treatment S: Administer sterile physiological saline solution (4.5 cc/100 lbs) IM in neck as described in Treatment N. No more than 10 cc were given at any one site and splitting total dose as equally as possible between right and left sides.

A new sterile 16 gauge/1.5 inch needle was used for each calf. Sterile plastic syringes (12 cc) were used and discarded after every 20 calves. Total injection volumes were determined as each calf was weighed.

At processing, calves were also given 2 cc of haemophilus somnus pasteurella haemolytica multocida bacterin with an 1-inch needle, intramuscularly in the middle gluteus muscle just caudal to the tuber coxae. All calves received a Synovex-S implant either at processing (165 head) or site of origin (75 head).

Ration and Feeding. The ration consisted of: 10% corn silage, 25% ground alfalfa hay, 13.75% dry rolled milo, 41.25% cracked corn, 5% pelleted supplement, 3.25% blended molasses, and 1.75% yellow grease on an as-fed basis. Upon arrival, cattle were given access to fresh water and baled bromegrass hay offered free choice. Decoquinate was fed daily at approximately 22 mg/100 lb body weight per head for the trial. Vitamins A, D, and E were also fed continuously. All micro-ingredients (decoquinate, antibiotic, and vitamins) were added to feed batches by a micro-ingredient weigh machine.

Feed was provided to allow for ad libitum consumption without excessive accumulation of feed. Cattle were fed once daily in the morning.

Feed was weighed prior to feeding, and the feed that was not consumed (orts) before the next feeding was removed from the bunk, weighed, and discarded. No other feed source was provided that could not be accurately weighed on a daily basis. Dry matters were taken twice a week and a running composite of ort dry matters was taken. Fresh water was available at all times.

Each treatment included five pen replicates with 14 calves per pen and one pen replicate with 10 calves. Each pen provided 18 linear feet of bunk space with an effective length of 17 feet. Each calf had an average of 15.3 inches of linear bunk space.

Health. Animals deemed sick and in need of treatment after the commencement of the trial were to be pulled and treated according to the standard procedures used at the SWREC. All calves pulled for medical treatment were to be kept separate and not returned to home pens until conclusion of the 14-day trial. Each calf was individually scored daily in regards to effects of treatments on physical appearance and activity.

RESULTS AND DISCUSSION

Performance. A comparison between the S (saline) and R (round) treatments was not of interest; however, the statistical analysis indicated significant effects on performance as shown in Table 1. Final weight was similar (P>.10) between the N and

Table 1. Feedlot performance of calves injected with LA-200 in the neck (N) or round (R) or saline (S) in the neck for a 14 -day receiving period.

	TREATMENTS				
ITEM	NECK (N)	ROUND (R)	SALINE (S)	SEM[d]	P <
No. of Calves	80	79	80		
Initial Wt, lb	673	663	667	11	
Final Wt, lb	703[ab]	697[b]	709[a]	3	.0194
Intake, lb	17.17[b]	16.89[b]	18.14[a]	.32	.0534
ADG, $lb \cdot hd^{-1} \cdot d^{-1}$	2.53[ab]	2.13[b]	3.00[a]	.23	.0194
Gain to Feed	6.80	7.94	6.06	.013	

Contrast using Rep(trt) as the testing (error) term.

Final weight	Neck vs Saline	NS[c]
	Neck vs Round	NS
Intake	Neck vs Saline	P < .0534
	Neck vs Round	NS
Average Daily Gain	Neck vs Saline	NS
	Neck vs Round	NS

[ab] Least Square Treatment Means with different superscripts differ at P level in P < column of table.
[c] NS = Non-significant, P > .10.
[d] SEM = Standard error of treatment mean.

S calves and the N and R animals. Final weight of S calves was increased 1.72% compared with the R calves (P<.02). Cumulative daily intake for the 14-day trial was similar between the N and R calves (P>.10); the N calves consumed 0.28 more lbs of dry matter per head per day compared with the R group. LA-200 injected into the neck (N) and round (R) areas depressed intake by 6.52% compared with injecting saline (S) into the neck region (P<.06). Comparing the intakes of S and N calves, the S calves consumed 5.65% more (P<.06) dry matter daily. Average daily gains for the S and R calves were not different (P>.10) compared with N calves. But rate of gain was 40.85% faster for S calves than R calves. Daily dry matter intake is given in Table 2. Split-plot analysis indicated a non-significant day by treatment interaction (P = .1819). Therefore, intake was pooled across time, i.e., days, within a treatment. Feed conversion was not affected (P>.10) by the treatments.

Table 2. Daily dry matter intake of calves injected with LA-200 in the neck (N) or round (R) or saline (S) in the neck for a 14-day receiving period.

	TREATMENTS		
DAY	N	R	S
	lbs		
1	13.64	12.36	13.39
2	14.80	12.54	17.31
3	15.49	13.93	15.84
4	17.22	16.95	17.29
5	16.84	17.25	18.96
6	16.44	15.60	19.21
7	16.64	16.54	17.71
8	17.89	17.67	18.50
9	18.51	17.38	18.20
11	18.02	19.29	18.68
12	19.57	18.88	19.87
13	18.88	18.80	19.25
14	19.24	19.74	20.62

Health. Visual scoring was started on day 2 and continued until day 13 of the trial. Calves were visually inspected on the 14th day, but observations were not recorded because no ill effects were noted. These data was not analyzed. No calves were removed from the study for to health problems.

CONCLUSIONS

Injection of LA-200 either in the neck or round region had similar effects on feedlot performance during a 14-day receiving period. Performance of calves that received the LA-200 injection in the neck actually performed better compared with calves injected in the round area. Regardless of injection site, LA-200 depressed final shrunk live body weight, intake, and average daily gain compared with injecting saline in the neck region. However, there was had no effect on feed conversion. Visually, all calves appeared in good health, and feeding patterns were not adversely affected by any treatment.

ACKNOWLEDGMENTS

The SWREC Livestock Project personnel greatly appreciates the assistance of Stan O'Neill, Territory Manager, Pfizer Animal Health, in processing the calves used in this study.

This center is also grateful for Pfizer's support of the project and furnishing the Liquamycin LA-200 used in this study.

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KSU Southwest Research-Extension Center

EFFECT OF ROUGHAGE AND FAT LEVEL ON FEEDLOT PERFORMANCE, CARCASS MERIT, AND INCIDENCE OF LIVER ABSCESSES OF BEEF STEERS FED A HIGH-MOISTURE CORN AND STEAM-ROLLED WHEAT FINISHING DIET

by

A. S. Freeman and C. Leatherwood[1]

SUMMARY

One hundred-ninety two yearling beef steers (average weight 725 lbs) were used to investigate the effects of roughage and fat levels in a high-moisture corn and steam-rolled wheat grain diet on the feedlot performance, carcass merit, and incidences of liver abscesses. The feeding trial was 133 days. Treatments were arranged in a two-by-three factorial with two levels of roughage, 6 and 10% on a dry basis, and three fat levels, 0, 4, and 6% on a dry basis. No treatment interactions were present except for back fat thickness. Feedlot performance was minimally affected by roughage level. The 0 and 6% fat levels affected feedlot performance similarly by depressing intake, average daily gain, and feed conversion compared with the 4% level of fat. Roughage level influenced carcass merit and incidences of liver abscesses more then did fat level. Optimal performance and carcass merit were obtained with 4% added fat at either 6 or 10% roughage level.

INTRODUCTION

High-moisture corn stored in a bunker and wheat processed enough to rupture the seed coat are both on the high-rated end of the ruminal fermentation scale. Several recent studies have shown that a combination of high moisture grains (67%) and steam-rolled wheat (33%) produced optimal feedlot performance and carcass merit.

Separately, various roughage levels and added fat levels have been investigated with numerous grain combinations. Grain combinations are thought to improve animal performance by providing a more even rate of fermentation and energy utilization throughout the digestive tract. When two rapidly fermentable grains are utilized, roughage level becomes very critical in maintaining animal health and rumen function by possibly decreasing digestive up-set. Also, recent research has shown that fat may have a modulating effect on the rapid changes in ruminal fermentation rate by buffering ruminal pH.

Therefore, this study was designed to determine the effects of roughage and fat levels in a finishing diet combining high-moisture corn and steam-rolled wheat.

OBJECTIVE

To determine if an interaction exists between roughage and fat level in a high-moisture corn (67%) and steam-rolled wheat (33%) finishing diet in effects on feedlot performance, carcass merit, and incidence of liver abscesses in yearling beef steers.

PROCEDURES

Six treatments were randomly allotted to 24 pens with 4 pen replicates per treatment. Then 192 yearling beef steers (average weight 725 lbs) were randomly allotted by weight, breed, frame score, and condition to these 24 pens with eight steers per pen. Each treatment had 32 steers. Cattle were implanted with Compudose and processed by standard procedures. The feeding period was 133 days, with weights taken at approximately 27-day intervals.

The six treatments were 6% roughage with three fat levels of 0%, 4%, and 6% and 10% roughage with three fat levels of 0%, 4%, and 6% all on a dry matter basis. The finishing diet composition and nutrient analysis by treatment are given in Table 1. The high-moisture corn, 67% of the grain on an as-fed basis, had an average moisture content of 28%. The wheat, 33% of the grain on an as-fed basis, was steam-rolled to a flake density of 39 lbs/bu and was fed at an average moisture level of 13%. The roughage source was a 50-50% mixture of alfalfa hay and corn silage on a dry matter basis. Steers were adjusted to monensin over a 2-week dietary step-up period. The final monensin concentration per head daily was 300 mg with tylan being fed at a rate of 90 mg per head daily.

RESULTS AND DISCUSSION

Dry Matter Intake. During the entire 133-day trial, cumulative dry matter intake was increased (P

Table 1. Diet composition and nutrient analysis of high-moisture and steam-rolled grain finishing diets at two roughage levels and three fat levels.

	TREATMENTS					
	6% Roughage			10% Roughage		
ITEM	0 fat	4% fat	6% fat	0 fat	4% fat	6% fat
	- - - - - - - - Dry Matter Basis, % - - - - - - - -					
High-Moisture Corn	52.6	49.4	47.8	50.3	47.0	45.3
Steam-Rolled Wheat	34.8	32.6	31.6	33.2	31.0	29.9
Corn Silage	2.5	2.6	2.5	4.8	5.1	5.2
Alfalfa Hay	3.5	3.4	3.5	5.3	4.9	4.8
Molasses	2.1	2.0	2.0	2.0	2.1	2.1
Supplement	4.5	6.0	6.6	4.4	5.9	6.7
Special Tallow	0	4	6	0	4	6
Dry Matter	66.1	67.9	70.2	66.3	68.1	67.8
Crude Protein	12.8	13.1	12.2	12.9	13.7	13.3
ADF	4.7	5.8	4.8	6.4	6.1	5.6
TDN	89.7	88.3	89.6	87.7	88.0	88.7
NEm, Mcal/cwt	105	103	105	103	103	104
NEg, Mcal/cwt	72	71	72	70	70	71
Ca	0.51	0.43	0.58	0.52	0.73	0.77
P	0.32	0.32	0.31	0.33	0.31	0.35

<.10) by an average of 3% for the 10% roughage-level group compared with the 6% roughage-level group. This effect would be expected, because nutrient density of the ration is reduced with increased roughage levels. Therefore, to meet the same energy requirement, more feed must be consumed. Fat level also affected dry matter intake. A quadratic response was present at 57, 85, and 133 cumulative days on trial (Figure 1.). Intake for the 0% and 4% fat levels were similar. However, the 6% added level depressed intake by an average of 4% (P < .10). As can be seen in Figure 1., the 4% added fat level, regardless of roughage level, caused the greatest consumption of dry matter. Additionally, with a high-moisture/steam-rolled finishing diet, added fat levels greater than 4% appear to depress intake.

Average Daily Gain. Roughage level affected average daily gain in the first 29 days on feed. The 10% level improved (P < .04) rate of gain by 7.4% compared with the 6% roughage level. This improvement in gain early in the feeding period probably was due to gut fill and not true tissue gain. However, as with dry matter intake, there was a quadratic response to added fat level, which persisted throughout the trial (Figure 2.). The 4% added fat level improved (P < .004) average daily gain by an average of 10% compared with similar gains for the 0% and 6% levels. Thus, steers consuming the 4% added fat diet not only had the greatest intakes, but were also utilizing the consumed dietary nutrients most efficiently.

Figure 1. Forage and fat level trial. Cumulative dry matter intake by weigh periods. Quadratic effect of fat present. Means differ with uncommon letters, P < .10.

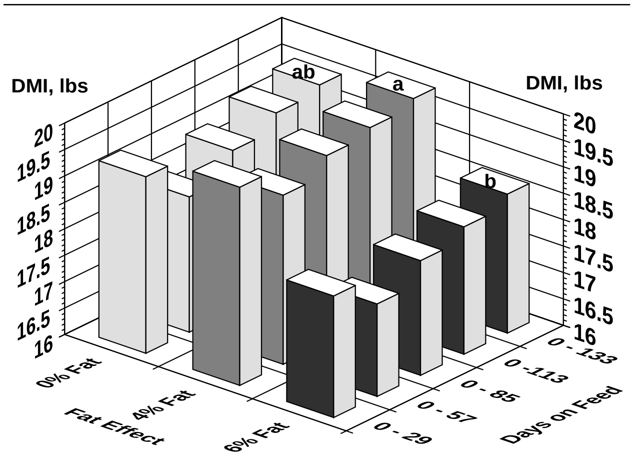
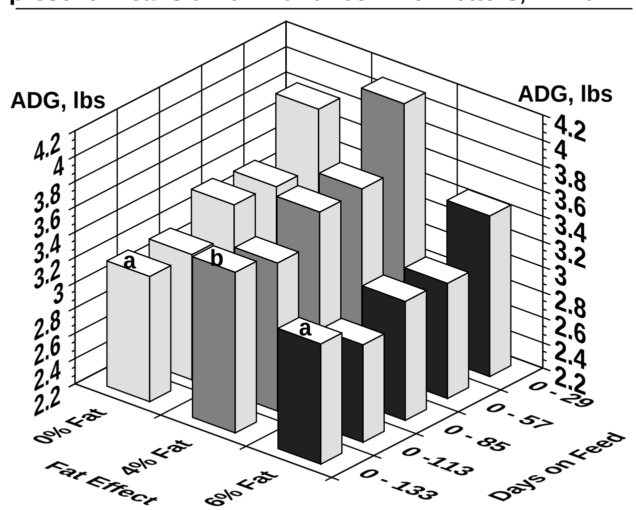


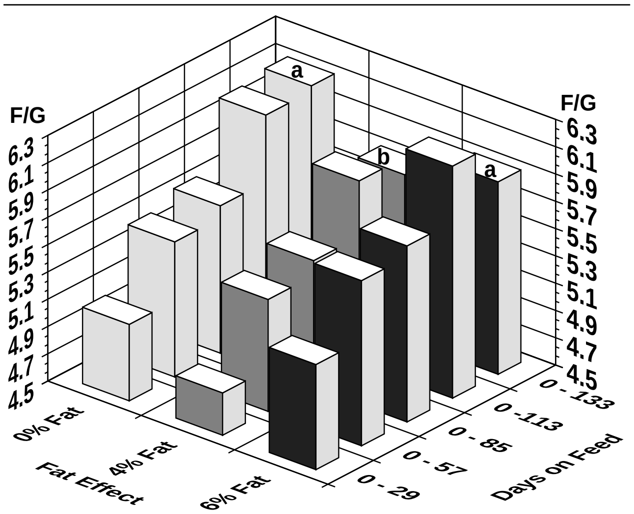
Figure 2. Forage and fat level trial. Cumulative average daily gain by weigh periods. Quadratic effect of fat present. Means differ with uncommon letters, P < .04.



Feed Conversion. Roughage level did not affect (P > .10) feed conversion during the trial. Feed to gain ratio averaged 5.93 for the two roughage levels. Additionally, no interaction between roughage and fat level was evident for any performance variable. Therefore, the roughage levels used in this study did not appear to influence ruminal function or affect animal health. However, added fat levels did affect nutrient utilization. A quadratic response (P < .05) for added fat levels was present for the 133-day finishing period (Figure 3.).

Feed conversion for the 0% and 6% fat levels was similar and average. Steers consuming the 4% level of added fat consumed .31 lbs less feed for each unit of gain.

Figure 3. Forage and fat level trial. Cumulative feed conversion by weigh periods. Quadratic effect of fat present. Means differ with uncommon letters, P < .05.



Carcass Merit and Liver Abscess Incidence. Carcass merit and liver abscess incidence are given in Table 2. A quadratic response to fat level (P < .05) occurred for hot carcass weight. Carcass weight was increased 24.5 lbs by the 4% fat level compared with no fat and the 6% level. Dressing percent was increased 0.6% by the 10% roughage level (P < .05). The 10% roughage level also increased (P < .05) KPH % by 3.3% and decreased (P < .05) yield grade by 11%. Rib-eye area and quality grade were not affected by treatments. An interaction between roughage and fat level was noted for back fat thickness (P < .08). Liver abscess score was reduced (P < .05) by the 10% roughage level compared with the 6% level of roughage. Fat level did not influence the incidence of liver abscesses.

CONCLUSIONS

Average daily gain was increased 2.5 times more than dry matter intake at the 4% added fat level. In addition, the 4% fat level improved feed conversion by 5% compared with 0% and 6% fat levels at either roughage level. Therefore, the author speculates that an optimal added fat level of 4% in a high-moisture corn and steam-rolled wheat based finishing diet improved nutrient utilization. The increased feed efficiency could have been caused by a

Table 2. Effect of roughage and fat levels on carcass merit and liver abscesses in steers being fed a high-moisture and steam-rolled grain finishing diet.

	TREATMENTS						
	6% Roughage			10% Roughage			
ITEM	0 fat	4% fat	6% fat	0 fat	4% fat	6% fat	SEM fat
No. of Steers	32	32	31	32	32	31	
Initial Wt, lb	730	725	723	725	725	721	26
Final Wt, lb	1115	1144	1113	1127	1173	1113	35
Hot Carcass Wt, lb[a]	701	719	699	708	734	699	22
Dressing Percent, %[b]	62.3	62.7	62.3	62.7	63.0	63.4	0.24
Rib-eye-area, in^2	13.08	13.17	13.19	12.94	12.83	12.85	0.23
Back Fat, in[c]	.42	.39	.43	.44	.54	.45	0.03
Quality Grade	Sm^{38}	Sm^{48}	Sm^{36}	Sm^{47}	Sm^{47}	Sm^{37}	
Marbling Score	5.38	5.48	5.36	5.47	5.47	5.37	0.06
KPH, %[b]	2.35	2.38	2.36	2.41	2.46	2.44	0.3
Yield Grade[b]	2.50	2.48	2.49	2.63	3.02	2.66	0.12
Liver Abscess Score[bd]	2.53	2.53	2.81	1.97	1.97	1.87	0.27
Condemned Livers, %	43.8	40.6	48.4	25.0	28.1	25.8	
Cost of gain, $	25.13	25.57	26.96	24.74	24.32	26.73	

[a] Quadratic Fat Level Effect, P < .05.
[b] Main Effect of Roughage Level, P < .05.
[c] Roughage and Fat Level Interaction, P < .08.
[d] Liver Abscess Score. 1 & 2 = Not condemned; 2, 3, 4, and 5 = graded levels of liver condemnation.

shift in starch digestion from the rumen to the small intestine and(or) enhanced ruminal fermentation and feed degradation to allow for increased passage of consumed feed resulting in increased intakes. Hot carcass weight also responded to the 4% fat level across roughage levels. However, other carcass characteristics and incidences of liver abscesses were influenced more by roughage level than by fat levels.

[1]Provided cooperator cattle for this study.

FLY PARASITE RELEASES RELATIVE TO FEEDLOT FLY POPULATIONS IN WESTERN KANSAS

by
G. L. Greene

SUMMARY

Release of Spalangia nigroaenea reduced stable fly emergence by 28% and increased parasitization by 28%. Fly emergence was 48% compared to 81% in nonrelease lots. S. nigroaenea emergence was 40% in release lots compared to 13% in nonrelease lots.

House fly parasitism was reduced below the levels in nonrelease lots when Muscidefurax zaraptor releases were discontinued. This indicates that release of M. zaraptor may reduce house fly emergence.

INTRODUCTION

There are many questions regarding use of fly parasites to reduce flies in cattle feedlots. The technology that spurred parasite sales was developed in poultry facilities. When it was transferred to cattle feedlots, we found that the parasite species used were not retrieved from feedlot flies, even after several years of releases. At the same time, we did find Spalangia nigroaenea to be common in stable fly pupae from western Kansas cattle feedlots.

Based on the natural occurrence of that fly parasite species, we released large numbers of parasites during 1991 in several feedlots to determine their effectiveness in reducing stable fly emergence.

PROCEDURE

Fly pupae were retrieved from cattle feedlots and held in the laboratory. Pupae were collected weekly from the fly breeding areas in the feedlot. When weather was dry or the feedlot was very clean, pupae could not be collected, resulting in weeks with no records. Fly pupae that did not emerge were dissected, and the contents categorized as dead unknown, dead fly, or dead parasite.

All emerged insects were identified by fly or parasite species. Those numbers were then calculated as percentages of totals collected or of live emerged individuals. The numbers collected were different for each year and location, so percentage was the only way to compare results. Three feedlots were sampled each year. Samples were taken weekly for 20 weeks when fly pupae could be found.

The sticky trap counts of stable flies are based on four round traps from each feedlot. Weekly counts were averaged and divided by 3.5 to give flies/day. The traps were covered with dust, insects, or simply failed to catch and hold the flies for about half of each week.

RESULTS AND DISCUSSION

Stable flies showed a 28% reduction in emergence when Spalangia nigroaenea were released during 1991 (Table 1). During 1990, when Muscidifurax zaraptor and Spalangia endius were released, 76% of the emerged pupae were stable flies. During the same year, 89% of the emerged pupae were stable flies in the nonrelease lots (Table 2). The 52% parasites emerging in 1991 was higher than the 8-year average of 38% parasitism from Kansas cattle feedlots.

Parasite emergence by genus showed a lower percentage of M. zaraptor from stable fly pupae in feedlots when they were released than when they were not released (5% in 1990 versus 12% in 1991). There was so much variation from feedlot to feedlot and year to year, that a difference of 10% or less is not a real difference. A 28% difference in fly or parasite emergence is worth reporting. The reduction of stable fly emergence by 8% and increase of parasitism by 8% in the nonrelease lots demonstrates a minor variation by year. Even if the 8% year difference is subtracted, there was 20% reduction in stable fly emergence and a 20% increase in parasite emergence when S. nigroanea was released.

The reduction in house fly parasitism of 10% from 1990 to 1991 may relate to the absence of M. zaraptor release during 1991. The M. zaraptor emergence increased 4% from 1990 to 1991 in the nonrelease lots. If that 4% is added to the release lot reduction of 10%, then there was a 14% reduction from 1990 to 1991. The house fly emergence in the release and nonrelease feedlots was similar during 1991 (75 and 78%). Emergence was 12% lower in the release lots than nonrelease lots during 1990.

Another measure of fly population is the number caught on Alsynite sticky traps (Table 3.) At the nonrelease lots, 22% more flies were caught during 1991 than 1990. The S. nigroaenea lots had 18% fewer flies than during 1990 when M. zaraptor, plus other parasite species, were released. If we believe that more stable flies occurred during 1991 than 1990, then the S. nigroaenea releases deserve a greater credit for stable fly reduction than indicated just fly reduction in the release lots.

Table 1. Fly and Parasite emergence from fly pupae collected from three cattle feedlots with commercial parasites released during 1990 and experimental releases of Spalangia nigroaenea during 1991.

				% LIVE FLIES AND PARASITES		
YEAR	TOTAL PUPAE COLLECTED	PUPAE EMERGED	FLIES	Total Parasites	Muscidifurax spp	Spalangia spp
Stable Flies						
1990	3083	928	76	24	5	19
1991	4143	1656	48	52	12	40
Reduction 90-91			28	28	7	21
House Flies						
1990	1023	502	68	32	21	11
1991	775	366	78	22	11	10
Reduction 90-91			10	10	10	1

Table 2. Fly and Parasite emergence from fly pupae collected from three cattle feedlots with no parasite releases during 1990-91.

				% LIVE FLIES AND PARASITES		
YEAR	TOTAL PUPAE COLLECTED	PUPAE EMERGED	FLIES	Total Parasites	Muscidifurax spp	Spalangia spp
Stable Flies						
1990	1742	781	89	11	7	4
1991	1431	577	81	19	6	13
Reduction 90-91			8	8	1	11
House Flies						
1990	5469	1911	80	20	12	8
1991	3861	1871	75	25	16	9
Reduction 90-91			5	5	4	1

Table 3. Season-long stable fly counts on sticky traps at Muscidifurax zaraptor lots during 1990 and Spalangia nigroaenea during 1991.

ITEM	NO RELEASE	PARASITE RELEASES
1990	595	813
1991	699	666
% Reduction	+22	-18

Lots were 50 miles apart with different rainfalls and fly breeding areas.

IPM FEEDLOT FLY RESEARCH PROGRAM

by

G. L. Greene

Releases of a local fly parasite gave promise for effective stable fly reduction during 1991. Those results prompted discussions with our cattle feedlot advisory group relative to forming a feedlot cooperator organization to test total management for fly reduction. The advisory group encouraged the effort, which began during September 1991, and produced a formal organization. Twenty-two cattle feedlots have joined to serve as experimental units for the 1992 fly season and hopefully will continue during the 4-year study.

The organization to handle the project funding is Fly Management Corporation. That corporation will grant funds to KSU to cover personnel costs. Parasite costs will be charged and paid directly from the corporation, which will not be profit oriented. That procedure will allow purchase of uniform and pure fly parasites of the Kansas strain.

Dr. Jim Cilek will be the project manager. He comes to the project from the University of Kentucky. Jim obtained his Ph.D. degree, then worked for 3 years on fly insecticide resistance with Dr. Fred Knapp. He will produce the weekly summaries of the feedlot data, help with research data, and test feedlot flies for their insecticide resistance levels.

The 1992 IPM program will provide an opportunity to test the effectiveness of Spalangia nigroaenea for fly reduction. Basic data on fly population estimations will be major parts of the research. Sanitation recommendations, fly counts, and number of parasites will be given to each feedlot operator each week. Those feedlots interested in house fly control will be studied relative to two parasite species released during late summer.

The objectives of this expanded fly management project are to:

1. Test a Kansas fly parasite under feedlot conditions
2. Develop a fly estimation system for parasite release numbers
3. Establish the number of parasites to release
4. Develop a workable IPM system appropriate for cattle feedlots
5. Analyze the economics of various control practices.

The contributions to this research project by the cooperating feedlots will make the effort worthwhile. Their cooperation is certainly appreciated!

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