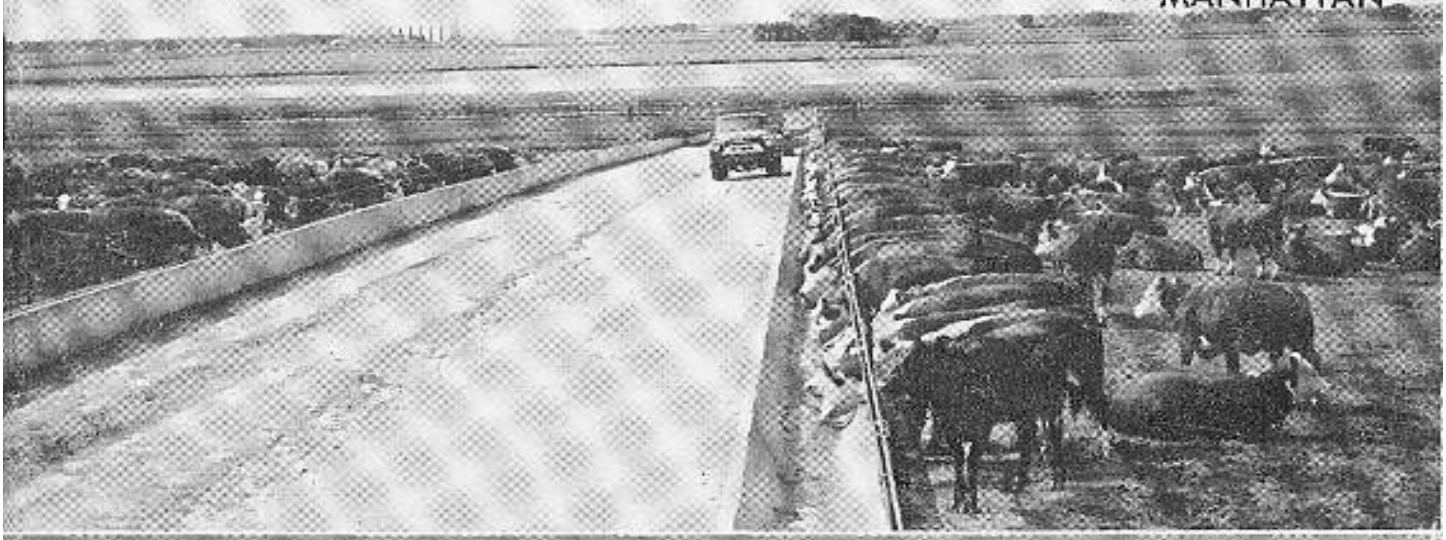
47th Annual LIVESTOCK FEEDERS' DAY

Circular 378
May 7, 1960

1959-'60 PROGRESS REPORTS

KANSAS AGRICULTURAL EXPERIMENT STATION, KANSAS STATE UNIVERSITY
MANHATTAN



CONTENTS

47th Annual Livestock Feeders' Day[1]

KANSAS STATE UNIVERSITY

MANHATTAN, KANSAS

Saturday, May 7, 1960

8:00 to 10:00 a.m.—Experimental lots of livestock on exhibit—Animal Husbandry Arena

10:00 a.m.—Arena

Presiding—Nicholas V. Hudelson, Pomona, Kansas, President, Kansas Livestock Association

Reviews of Experiments—Animal Husbandry Staff

Bluestem Pasture Management and Utilization Comparisons

Pelleting Feeds for Beef Cattle

Artificially Dried Grain for Beef Cattle

Enzymes, Cobalt, Antibiotics, Hormones and Tranquilizers for Steers and Heifers

Pelleted Rations for Fattening Lambs

Adding Yeast Culture and Lysine to Grain for Hogs

Hybrid Sorghum Grain vs. Corn for Hogs

Quality Meat Evaluation

Breeding for Improved Beef Characteristics

12:00 n. —Lunch—Arena

12:45 p.m.—Awards to Beef Production Contest Winners—Room 107, W. H. Atzenweiler, Agricultural Commissioner, Kansas City Chamber of Commerce; and Extension Animal Husbandman

1:15 p.m.—Some Problems I Meet in Making Beef in the Plains Area—Durward Lewter, Operator Lewter Feedlots, Lubbock, Texas

2:00 p.m.—Beef Making and Merchandising Problems from Range to Consumer—Panel Members

On the Range—Pat Mulloy, Mgr., Jeff Ranch, Fort Davis, Texas

Summering Cattle on Grass — Wayne Rogler, Matfield Green, Kansas

In the Feedlot — Durward Lewter, commercial feedlot operator, Lubbock, Texas

Earl Brookover, commercial feedlot operator, Garden City, Kansas

Girdner Crofoot, Feeder, Cottonwood Falls, Kansas

At the Market—Gene Gunter, Immediate Past President, National Livestock Exchange, Wichita, Kansas

At the Packing Plant—George A. McGlumphy, General Manager, Seitz Packing Company, St. Joseph, Missouri

Questions and Discussion

3:00 p.m.—Adjournment

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1. Contribution No. 241, Department of Animal Husbandry; No. 697, Department of Agronomy; No. 602, Department of Chemistry; and No. 35, Garden City Branch Station; No. 52, Department of Statistics; No. 178, Department of Veterinary Medicine; all of the Kansas Agricultural Experiment Station.

6:30 p.m.—Kansas State Union. Banquet for visiting stockmen and ladies—Block and Bridle Club

Honoring—Grover Poole, Manhattan, Kansas
Joe O'Bryan, Hiattville, Kansas
The late H. G. Reuber, Atwood, Kansas

FOR THE LADIES

Friday, May 6, 1960

6:30 p.m.—Dinner, Gillett Hotel—Kansas Cow Belles and visiting ladies (Make reservations with Mrs. C. W. McCampbell, 1127 Thurston Street)

Saturday, May 7, 1960

9:30 a.m.—Coffee, Justin Hall (New Home Economics Building)—by Animal Husbandry ladies

10:30 a.m.—Tour and Program—Home Economics staff

12:00 n. —Lunch—Arena, Animal Industries Building

6:30 p.m.—Block and Bridle Banquet (See general program)

COVER PHOTOS are of the Brookover Feedlots near Garden City, Kansas. These are symbolic of a rapidly growing commercial feeding industry in this state. These yards have a capacity of 11,000 head of cattle and turn out some 11 to 12 million pounds of beef annually. This beef is produced primarily from such Kansas feeds as grass, hay, silage and sorghum grain. Only protein supplement must be purchased to balance the feeds produced in abundance in Kansas.

Swine

The Value of Soaking Shelled Corn for Finishing Spring Pigs on Alfalfa Pasture (Project 110-2).

C. E. Aubel

Soaking grain for pigs has been revived and an automatic and self-feeder that soaks grain is on the market. This experiment was to test that system of feeding corn.

Two lots of nine pigs each were self-fed, free choice, shelled corn and a mixed protein supplement as a basal ration. The treatment of the two lots varied only in that corn for lot 2 was soaked in water. The protein supplement fed both lots consisted of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal.

Results are given in Table 1.

Observations

Pigs fed soaked shelled corn gained .04 pound per day more than those fed dry shelled corn. The pigs fed the soaked shelled corn ate more each day than those receiving dry shelled corn. It required 33 pounds more of corn for the soaked corn fed pigs to make 100 pounds gain.

Soaking the corn in this experiment was of no particular advantage.

Table 1

The value of soaking corn for finishing spring pigs on alfalfa pasture.[1]

June 2, 1959, to September 15, 1959—106 days.

Item	Dry shelled corn	Soaked shelled corn
Lot number	1	2
Number pigs in lot	9	9
Av. initial wt. per pig, lbs.	51.77	51.55
Av. final wt. per pig, lbs.	196.66	201.33
Av. total gain per pig, lbs.	144.89	148.78
Av. daily gain per pig, lbs.	1.36	1.40
Av. daily ration per pig, lbs.:		
Shelled corn	3.38	3.94
Protein supplement	.54	.51
Lbs. feed per 100 lbs. gain per pig:		
Shelled corn	247.77	280.80
Protein supplement	39.57	36.89

1. Both lots received the same protein supplement.

The Comparative Value of Shelled Corn and Sorghum Grain Prepared by Different Milling Processes for Finishing Fall Pigs in Drylot (Project 110-3).

C. E. Aubel

Grain sorghums are being grown extensively in many parts of the High Plains. Sorghum grain previously has given excellent results compared with corn in feeding tests with swine at this station.

New ways of processing grain may improve the efficiency of the grains for feeding and thus provide more profit in hog raising.

Five lots of pigs were self-fed, free choice, in drylot. All lots received a mixed animal and plant protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. Each ton of mixed protein supplement also contained 27 pounds of Aurofac[1] and one half pound of zinc oxide. The ration for each lot varied only in the method of processing.

1. Registered trademark American Cyanamid Company for Aureomycin.

Lot 1. Whole sorghum grain.
Lot 2. Dry rolled sorghum grain.
Lot 3. Steam rolled sorghum grain.
Lot 4. Steamed sorghum grain with rolling or crimping delayed four hours.
Lot 5. Shelled corn.

The sorghum grain was steamed at 90 pounds pressure and at 180° F. Results are presented in Table 2.

Observations

Pigs receiving the steam rolled sorghum grain gained just .02 pound less per day than those receiving shelled corn. Gains in lot 2 were .02 pound per day less than those getting the steam rolled grain.

Delaying the crimping four hours (lot 4) seemed not to improve gains.

Poorest gains were from unprocessed sorghum grain.

All factors considered, the sorghum grains proved satisfactory—confirming earlier experiments at this station.

The lot fed corn made good gains with low corn consumption of grain. The corn quality was very good.

Table 2

The comparative value of shelled corn and sorghum grain prepared by different milling processes for finishing fall pigs in drylot.[1]

December 5, 1959, to March 3, 1960—89 days.

	RATION FED				
	Sorghum grain				
Items	Whole	Dry rolled	Steam rolled	Steam rolled, delayed crimp	Shelled corn
Lot number	1	2	3	4	5
Number pigs per lot	10	10	10	10	10
Av. initial wt. per pig, lbs.	58.50	58.50	58.40	58.30	58.90
Av. final wt. per pig, lbs.	177.60	184.60	185.70	179.00	188.60
Av. total gain per pig, lbs.	119.10	126.10	127.30	120.70	129.70
Av. daily gain per pig, lbs.	1.33	1.41	1.43	1.35	1.45
Av. daily ration per pig, lbs.:					
Shelled corn					4.37
Sorghum grain	4.85	5.05	5.33	5.46	
Protein supplement	.70	.69	.74	.64	.67
Lbs. feed per cwt. gain per pig:					
Shelled corn					300.30
Sorghum grain	362.80	356.85	373.21	383.30	
Protein supplement	52.30	48.85	52.00	47.47	46.49

1. All lots received the same protein mix supplement.

The Value of Soaking Whole Sorghum Grain for Finishing Fall Pigs in Drylot (Project 110-4).

C. E. Aubel

Two lots of pigs were self-fed, free choice, whole sorghum grain and a mixed protein supplement. Each lot contained 10 pigs. In one lot, the whole sorghum grain was fed dry; in the other, it was automatically fed into water warmed enough to prevent freezing.

The protein supplement fed both lots consisted of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. To each ton of supplement was added 27 pounds of antibiotic Aurofac[1] (Aureomycin) and one half pound of zinc oxide.

1. Registered trademark American Cyanamid Company for Aureomycin.

The results are listed in Table 3.

Observations

The lot of pigs receiving soaked whole sorghum grain made faster daily gains but consumed about 19 pounds more grain per 100 pounds gain than the lot fed dry whole sorghum grain. They ate about the same quantity of protein supplement. The soaked grain apparently was more palatable than the dry, for the pigs ate one pound more per head daily.

Table 3

The value of soaking whole sorghum grain for finishing fall pigs in drylot.[1]

December 5, 1959, to March 3, 1960—89 days.

Item	Whole dry sorghum grain	Soaked whole sorghum grain
Lot number	1	2
Number pigs in lot	10	10
Av. initial wt. per pig, lbs.	58.50	59.40
Av. final wt. per pig, lbs.	177.60	196.00
Av. total gain per pig, lbs.	119.10	136.60
Av. daily gain per pig, lbs.	1.33	1.53
Av. daily ration per pig, lbs.:		
Sorghum grain	4.85	5.84
Protein supplement	.70	.77
Lbs. feed per cwt. gain per pig:		
Sorghum grain	362.80	381.03
Protein supplement	52.30	50.51

1. Both lots received the same protein supplement.

The Value of Yeast Culture and L-Lysine (Amino Acid) in a Sorghum Grain Ration for Finishing Fall Pigs in Drylot[1] (Project 110-5).

C. E. Aubel

Sorghum grain is deficient in the amino acid, lysine. This test was to determine the value of a lysine feeding supplement recently on the market. Cultured yeast also is a source of lysine.

Three lots of 10 pigs each were fed, free choice, whole sorghum grain with a mixed protein supplement. One lot received the whole sorghum grain and a mixed protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. To each ton of the supplement 27 pounds Aurofac[2] and one half pound zinc oxide were added. A second lot was fed the same except that 100 pounds of yeast culture was added to each 500 pounds of protein mix. A third lot was fed as lot 1 except that 10 pounds I-Lysine feeding supplement was added to each ton of protein supplement.

The results are presented in Table 4.

Observations

Adding yeast culture or I-Lysine feeding supplement to a protein supplement fed with whole sorghum grain increased the rate of gain and decreased the quantity of sorghum grain required to produce 100 pounds of gain.

The protein supplement consumed was about the same in all lots; palatability was slightly better when yeast culture or I-Lysine was fed.

1. Chas. Pfizer & Co., Inc., Terre Haute, Ind., supplied the L-Lysine feeding supplement, and Diamond V Mills, Cedar Rapids, Iowa, the yeast culture used in this experiment.
2. Registered trademark American Cyanamid Company for Aureomycin.

Table 4

The value of yeast culture and L-Lysine (amino acid) in a sorghum grain ration for finishing fall pigs in drylot.

December 5, 1959, to March 3, 1960—89 days.

	Whole sorghum grain, mixed protein	Whole sorghum grain + 100 lbs. yeast culture in each 500 lbs. protein supplement	Whole sorghum grain + 10 lbs. I-Lysine supplement per ton of protein supplement
Lot number	1	2	3
Number pigs per lot	10	10	10
Av. initial wt. per pig, lbs.	58.50	59.50	58.60
Av. final wt. per pig, lbs.	177.60	185.00	183.00
Av. total gain per pig, lbs.	119.10	125.50	124.40
Av. daily gain per pig, lbs.	1.33	1.41	1.39
Av. daily ration per pig, lbs.:			
Sorghum grain	4.85	4.97	4.80
Protein supplement	.70	.76	.74
Lbs. feed per cwt. gain per pig:			
Sorghum grain	362.80	352.82	344.05
Protein supplement	52.30	54.34	52.97

The Value of Terramycin (TM-10)[1] and Oleandomycin in the Protein Supplement for Fattening Spring Pigs on Alfalfa Pasture (Project 110-1).

C. E. Aubel

The antibiotic, Oleandomycin, is a recent introduction.[2] This experiment was to test the antibiotic's value.

Three lots of nine pigs each were self-fed shelled corn and a mixed protein supplement on alfalfa pasture. All three lots had the same mixed protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal. 4½ pounds of Terramycin TM-10 and 4½ pounds of Oleandomycin were added per ton to the protein mixture of lot 2. Lot 3 pigs had 4½ pounds of Oleandomycin premix added per ton to their protein mixture.

Results are given in Table 5.

1. Registered trademark of Chas. Pfizer & Co., Inc., for Terramycin.

2. Chas. Pfizer & Co., Inc., Terre Haute, Ind., supplied the Terramycin supplement TM-10 and Oleandomycin for this experiment.

Table 5

The value of the antibiotics Terramycin (TM-10) and Oleandomycin in the protein supplement for fattening spring pigs on alfalfa pasture.

June 2, 1959, to September 15, 1959—106 days.

Basal ration fed on alfalfa pasture. Shelled corn, mixed protein supplement	Basal	Basal + 4½ lbs. Terramycin TM-10, 4½ lbs. Oleandomycin per ton of supplement	Basal + 4½ lbs. Oleandomycin per ton of supplement
Lot number	1	2	3
Number of pigs in lot	9	9	9
Av. initial wt. per pig, lbs.	51.77	52.11	51.44
Av. final wt. per pig, lbs.	196.66	189.66	204.77
Av. total gain per pig, lbs.	144.89	137.55	153.33
Av. daily gain per pig, lbs.	1.36	1.29	1.44
Av. daily ration per pig, lbs.:			
Shelled corn	3.38	3.41	3.84
Protein supplement	.54	.64	.61
Lbs. feed per cwt. gain per pig:			
Shelled corn	247.77	262.93	265.73
Protein supplement	39.57	50.08	42.68

Observations

The pigs that received both Terramycin (TM-10) and Oleandomycin made the smallest daily gain. The best gain (1.44 pounds a day) was by lot 3 receiving one antibiotic, Oleandomycin. The quantity of grain and protein supplement consumed per 100 pounds gain varied little in the three lots, but was least for those getting no antibiotic.

Kansas Swine Improvement Association Testing Station

The Kansas Swine Testing Station is in its second year of operation and a summary of testing results is presented here. The station, located at the University, was built by private contributions. It is being supervised by personnel of the Department of Animal Husbandry. All expenses involved in testing are paid by the breeders or producers who have pigs on test.

It is now possible for commercial swine men to enter barrows at the station if they are interested in obtaining carcass information on the pigs they are producing. Such barrows are fed in a group with all other barrows on test until they reach a slaughter weight of 200 pounds. All slaughter data is determined in the Department of Animal Husbandry by Professors Mackintosh and Merkel.

Information concerning the testing program can be obtained by contacting the Kansas Swine Improvement Association, the Department of Animal Husbandry, or the Extension Service.

Table 6

Swine Testing Results

	BOARS			BARROWS		
	High	Av.	Low	High	Av.	Low
Winter 1958-1959						
Daily gain, lbs.	2.58	1.98	1.50	2.25	1.77	1.35
Backfat, in.	1.60	1.10	0.70	2.17	1.71	1.42
Efficiency, lbs.	3.46	3.05	2.70			
Loin eye, sq. in.				5.79	3.77	3.17
Total cost (incl. sale)		$ 51			$ 38	
Sale price	$550	$158	$ 40		$ 32	
Summer, 1959						
Daily gain, lbs.	2.19	1.84	1.50	2.18	1.82	1.33
Backfat, in.	1.48	1.20	0.62	2.00	1.54	1.28
Efficiency, lbs.	3.06	2.82	2.52			
Loin eye, sq. in.				4.24	3.39	2.45
Total cost (incl. sale)		$ 47			$ 36	
Sale price	$320	$123	$ 35		$ 28	
Winter, 1959-1960						
Daily gain, lbs.	2.11	1.87	1.65	2.23	1.96	1.48
Backfat, in.	1.37	1.08	0.83	1.93	1.60	1.35
Efficiency, lbs.	3.24	3.00	2.78	4.10	3.45	3.08
Loin eye, sq. in.				4.22	3.95	3.30
Total cost (incl. sale)		$ 50			$ 40	
Sale price	$250	$166	$ 55		$ 24	

Slaughter Data (Summary)

Number slaughtered	72	
Av. slaughter wt., lbs.	198	(192-208)
Av. % lean cuts	47.93	(42.10-55.22)
Av. loin eye area, sq. in.	3.57	(2.50- 5.79)
Av. backfat, in.	1.65	(1.28- 2.17)
Av. carcass length, in.	29.09	(27.05-31.75)
USDA carcass grades:		
No. 1	36	
No. 2	26	
No. 3	10	

Beef Cattle

Response of Previously Implanted[1] Cattle to Oral Diethylstilbestrol[2] (Project 430).

B. A. Koch, E. F. Smith, D. Richardson, and R. F. Cox

Steer calves used in a trace mineral study reported elsewhere in this publication were also used in a study designed to further determine the effect of previous implantation with diethylstilbestrol on feedlot performance.

Experimental Procedure

May 4, 1959, steers on the trace mineral study in Woodson county were randomly divided. A 12-mg. implant of diethylstilbestrol was placed in the left ear of each of six calves in either treatment group. All calves grazed on native pasture until August 1, 1959. They were then weighed off pasture and trucked to Manhattan. After a one-week adjustment period they were started on full feed. The fattening period lasted 90 days; during that time all steers received 10 mgs. of oral diethylstilbestrol per head per day.

The ration fed included ground corn, prairie hay, and 1 pound of soybean oil meal per head per day. Corn was increased gradually for the first three weeks until the cattle were on full feed. Thereafter corn and prairie hay were available at all times on a free-choice basis.

Salt and a mixture of salt and bonemeal were available at all times, as was water from automatic waterers.

Observations

Gain and carcass data are summarized in Table 7. Since control and implanted steers were fed together, feed efficiency could not be calculated.

During the 89-day grazing period, the implanted calves gained 19 pounds more each than control calves in the same pastures. That is an advantage of 0.22 pound per day for the implanted calves during the grazing period.

During the fattening phase the control calves and the previously implanted calves were fed together. Average daily gains for the two groups were very similar. A summary of the carcass data also failed to show any differences that might have occurred from implants prior to the grazing period.

1. Stimplants furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
2. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.

Table 7

Response of previously implanted steers to oral diethylstilbestrol in the fattening ration.

Treatment	Control	12-mg. DES implant
Phase 1—Grazing—May 4, 1959, to August 1, 1959—89 days.		
Number steers	12	12
Av. initial wt., lbs.	703	687
Av. final wt., lbs.	891	894
Av. total gain, lbs.	188	207
Av. daily gain, lbs.	2.11	2.33
Phase 2—Fattening—August 8, 1959, to November 6, 1959—90 days.		
Number steers	12	11[1]
Av. initial wt., lbs.	845	840
Av. final wt., lbs.	1168	1172
Av. total gain, lbs.	323	332
Av. daily gain, lbs.	3.59	3.69

1. One calf died September 5, 1959.

Table 7 (Continued)

Standard error	±0.12	±0.28
Carcass grades, USDA:		
Low choice	1	3
High good	3	1
Av. good	3	1
Low good	4	5
High standard	1	1
Av. USDA grade[2]	10.9	11.0
Av. marbling score[3]	7.6	7.4
Av. firmness score[4]	4.0	4.3
Av. fat thickness, in.[5]	0.62	0.58
Av. ribeye, sq. in.[5]	12.59	12.24

2. Average grade determined as follows: Low choice, 13; high good, 12; average good, 11; low good, 10; high standard, 9.
3. Visual marbling score: moderate, 5; modest, 6; small amount, 7; slight amount, 8.
4. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.
5. Measured at 12th rib.

Trifluomeprazine Fed to Fattening Steers. Project 626*

B. A. Koch, E. F. Smith, D. Richardson, and M. M. McCartor

Trifluomeprazine (TFL) fed to fattening steer calves at the rate of 5.0 mgs. per day apparently increased gains significantly in an earlier trial. However, the tranquilizer gave no increase in gain when fed at the rate of 2.5 mgs. per day. This study was designed to again check the response at the 5.0-mg. level and also to determine if a higher level (10.0 mgs. per day) would give a response.

Experimental Procedure

The steers used in this study were good to choice grade Herefords, averaging 980 pounds, that originated in New Mexico. They had been wintered in central Kansas at a rather high level of feeding. The steers were randomly allotted, according to weight, into four groups of 10 animals each. Treatment groups were as follows:

1. Control ration.
2. Control plus 10.0 mgs. of oral diethylstilbestrol (DES) per head per day.
3. Control plus 5.0 mgs. of trifluomeprazine (TFL) per head per day.
4. Control plus 10.0 mgs. of trifluomeprazine per head per day.

The steers were brought to a full feed of cracked corn plus alfalfa hay and soybean oil meal during the first three weeks of the feeding period. Sorghum silage was mixed with the grain during this preliminary period. Silage was decreased daily and grain was increased until the cattle were on a full feed of grain. After they were on full feed, cracked corn was available at all times on a free-choice basis. One pound of soybean oil meal per head per day was scattered over the grain each day. Additives were carried in the soybean oil meal. Alfalfa hay was limited to 3 or 4 pounds each per day throughout the feeding period.

The cattle were kept in concrete-floored lots with open sheds on the north. Water was available from automatic waterers at all times. Salt and a mixture of salt and bonemeal were also available at all times.

Observations

Feedlot and slaughter data are summarized in Table 8. Feeding 10 mgs. of oral stilbestrol per day resulted in a significant increase in average

* Partially supported by a grant from Smith, Kline, and French Lab., Philadelphia, Pa.

1. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.
2. Trifluomeprazine furnished by Smith, Kline, & French Lab., Philadelphia, Pa.

daily gain of approximately 4/10 pound per day. Feeding trifluomeprazine at the rate of either 5.0 mgs. per head per day or 10.0 mgs. per head per day did not increase average daily gain. None of the cattle receiving tranquilizer showed any evidence of sedation or quieting. There is some evidence in the literature that tranquilizers will alleviate heat stress. However, the cattle in this study did not seem to be able to stand high temperatures better when they were fed trifluomeprazine. Carcasses from cattle receiving either diethylstilbestrol or trifluomeprazine were equal in measurement and grade to carcasses from control animals.

Table 8

Trifluomeprazine fed to fattening steers.

June 16, 1959, to October 24, 1959—120 days.

Treatment	Control	DES 10.0 mgs.	TFL 5.0 mgs.	TFL 10.0 mgs.
Steers per lot	10[1]	10[1]	10[2]	10
Av. initial wt., lbs.	989	972	984	976
Av. final wt., lbs.	1240	1274	1238	1233
Av. total gain, lbs.	251	302	254	257
Av. daily gain, lbs.	2.09	2.52	2.12	2.14
Standard error	±0.08	±0.13	±0.08	±0.10
Av. daily ration, lbs.:				
Ground corn	15.2	16.5	15.9	16.5
SBOM	1.0	1.0	1.0	1.0
Alfalfa hay	3.3	3.3	3.3	3.3
Sorghum silage	1.2	1.2	1.2	1.2
DES, mgs.	0	10	0	0
TFL, mgs.	0	0	5	10
Av. feed per cwt. gain, lbs.:				
Ground corn	771	681	807	771
SBOM	51	41	51	47
Alfalfa hay	166	135	166	153
Sorghum silage	63	52	63	58
DES, mgs.	0	397	0	0
TFL, mgs.	0	0	236	467
Feed cost per cwt. gain	$20.46	$18.03	$21.53	$20.44
Shrink to market, %	3.9	3.7	3.5	4.1
Packer yield, %	63.7	64.0	62.0	64.1
Carcass grade, USDA:				
Low prime	1	0	0	0
High choice	2	0	0	0
Av. choice	0	4	2	1
Low choice	4	5	5	7
High good	3	1	3	2
Av. USDA grade[3]	13.4	13.3	12.9	12.9
Av. marbling score[4]	5.6	5.6	6.1	6.1
Av. firmness score[5]	3.6	3.0	3.3	3.6
Av. fat thickness, in.[6]	1.11	1.08	0.91	1.03
Av. ribeye, sq. in.[6]	11.51	11.97	11.76	12.09

1. One steer foundered; not used in calculating gain data.

2. Two steers foundered; not used in calculating gain data.

3. Average grade determined as follows: Low prime, 16; high choice, 15; av. choice, 14; low choice, 13; high good, 12.

4. Visual marbling score: moderate, 5; modest, 6; small amount, 7; slight amount, 8.

5. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.

6. Measured at the 12th rib.

Trifluomeprazine[1] in Fattening Steer Calf Rations (with and without Diethylstilbestrol).[2] Project 626.*

B. A. Koch, E. F. Smith, D. Richardson, and M. M. McCartor

A preliminary report of this tranquilizer study, and a description of the cattle used, appeared on page 32 of Kansas Circular 371, May 2, 1959. That report was based on results obtained during the first 108 days of the fattening period.

Experimental Procedure

Sixty head of steer calves were randomly allotted according to weight into six groups of 10 each. Treatment groups were as follows:

1. Control ration.
2. Control plus 10.0 mgs. oral diethylstilbestrol per head per day.
3. Control plus 2.5 mgs. trifluomeprazine per head per day.
4. Control plus 5.0 mgs. trifluomeprazine per head per day.
5. Control plus 10.0 mgs. diethylstilbestrol plus 2.5 mgs. trifluomeprazine per head daily.
6. Control plus 10.0 mgs. diethylstilbestrol plus 5.0 mgs. trifluomeprazine per head daily.

The daily ration fed included 10 pounds of sorghum silage, 1.5 pounds of alfalfa hay, 1.0 pound of soybean oil meal, and a variable quantity of cracked corn—varied according to appetite of the steers. The corn, soybean oil meal, and silage were mixed together in the feed bunk each day. Additives were carried in the soybean oil meal.

The cattle were kept in concrete-floored lots which had open sheds on the north. Water was available from automatic waterers at all times. Salt and a mixture of salt and bonemeal were also available to the animals at all times.

Observations

Feedlot data and slaughter data are summarized in Table 9. Feeding 10.0 mgs. of diethylstilbestrol (DES) or 5.0 mgs. of trifluomeprazine (TFL) resulted in a significant increase in average daily gain (probability of 0.01). Feeding 2.5 mgs. of trifluomeprazine did not increase average daily gain. Feeding trifluomeprazine in addition to diethylstilbestrol did not increase gains obtained with diethylstilbestrol alone. Feeding 5.0 mgs. of trifluomeprazine apparently improved feed efficiency and decreased feed costs in this trial.

Feed additives did not produce undesirable side effects in any of the animals. Cattle receiving the tranquilizer showed no visible evidence of sedation or quieting. Carcasses from cattle receiving diethylstilbestrol, trifluomeprazine, or a combination of the two were equal in measurement and grade to carcasses from control animals.

* Partially supported by a grant from Smith, Kline, & French Lab., Philadelphia, Pa.

1. Trifluomeprazine furnished by Smith, Kline, & French Lab., Philadelphia, Pa.

2. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.

Table 9

Trifluomeprazine in fattening steer calf rations (with and without oral diethylstilbestrol).

December 5, 1958, to July 8, 1959—215 days.

Treatment	No diethylstilbestrol			10 mgs./day diethylstilbestrol		
	TFL., None	TFL., 2.5 mgs./day	TFL., 5.0 mgs./day	TFL., None	TFL., 2.5 mgs./day	TFL., 5.0 mgs./day
Number steers	8[1]	10	10	9[1]	10	10
Av. initial wt., lbs.	571	580	562	567	580	574
Av. final wt., lbs.	1018	1029	1061	1107	1081	1116
Av. total gain, lbs.	447	449	499	540	501	542
Av. daily gain, lbs.	2.08	2.09	2.32	2.51	2.33	2.52
Standard error	±0.02	±0.07	±0.05	±0.08	±0.08	±0.05
Av. daily ration, lbs.:						
Ground corn	12.01	13.10	13.03	13.98	13.45	14.31
Soybean meal	1.00	1.00	1.00	1.00	1.00	1.00
Alfalfa hay	1.65	1.65	1.65	1.65	1.65	1.65
Sorghum silage	9.55	10.21	10.09	10.03	10.37	10.35
DES, mgs.	0	0	0	10	10	10
TFL, mgs.	0	2.5	5.0	0	2.5	2.5
Av. feed per cwt. gain:						
Ground corn	604	627	562	576	577	568
Soybean meal	50	48	43	41	43	40
Alfalfa hay	83	79	71	68	71	66
Sorghum silage	502	489	435	413	445	411
DES, mgs.	0	0	0	400	430	400
TFL, mgs.	0	120	215	0	108	200
Feed cost per cwt. gain	$17.19	$17.92	$15.41	$16.20	$16.41	$15.97
Carcass grade, USDA:						
Av. choice	0	1	2	0	0	3
Low choice	1	3	1	5	4	2
High good	3	2	4	1	4	3
Av. good	2	2	1	1	0	2
Low good	2	2	2	2	1	0
High standard	0	0	0	0	1	0
Av. USDA grade[2]	11.3	11.9	12.0	12.0	11.9	12.4
Av. marbling score[3]	7.1	6.8	6.7	6.7	6.9	6.5
Av. firmness score[4]	4.2	3.3	3.7	3.6	3.7	3.1
Av. fat thickness, in.[5]	0.67	0.78	0.77	0.76	0.76	0.72
Av. ribeye, sq. in.[5]	10.95	10.35	10.56	11.90	11.14	11.17

1. Three animals not used in gain or carcass calculations because they were foundered.
2. Average grade determined as follows: Av. choice, 14; low choice, 13; high good, 12; av. good, 11; low good, 10; high standard, 9.
3. Visual marbling score: moderate, 5; modest, 6; small amount, 7; slight amount, 8.
4. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.
5. Measured at the twelfth rib.

Trace Mineral Salt[1] for Steers on Pasture and in the Fattening Lot (with Observations on Shrink). Project 430.

E. A. Koch, E. F. Smith, D. Richardson, and R. F. Cox

A preliminary report of this trace mineral study and a description of the cattle used appeared on page 28 of Kansas Circular 371 (May 2, 1959). That report included data obtained during the summer of 1958 while the cattle were grazing native pasture in Woodson county, Kansas.

Experimental Procedure

Twenty-four Hereford steers were wintered together at Manhattan from November 18, 1957, to May 16, 1958. May 6, 1958, the cattle were randomly allotted according to weight into two lost groups. The two groups of steers were placed on adjoining pastures in Woodson county, Kansas.

One group had access to a mixture of plain salt and bonemeal while the other group had access to a mixture of trace mineral salt and bonemeal. The cattle remained on pasture during the summer of 1958, the winter of 1958-1959, and the summer of 1959. During the winter period each steer received 1.5 pounds of soybean oil meal per day. Native prairie hay was also fed on days when snow covered the pastures.

Cattle were weighed at regular intervals throughout the test period. May 4, 1959, half of the calves in each group received a 12-mg. diethylstilbestrol implant[2] in the left ear.

August 1, 1959, the cattle were weighed off pasture, trucked to Manhattan, and again weighed individually off of the truck.

After a one-week rest and readjustment period the two groups of steers were started on a full-feed finishing ration. The finishing period lasted 90 days, during which time the control animals had access to plain salt and also to a plain salt-bonemeal mixture, while the others had access to trace mineral salt and also to a trace mineral salt-bonemeal mixture.

The ration fed included ground corn, prairie hay, and 1 pound of soybean meal per head daily. Each pound of soybean meal contained 10 mgs. of diethylstilbestrol.[3] Corn was increased gradually for the first three weeks until the cattle were on full feed. Thereafter corn and prairie hay were available at all times on a free-choice basis.

At the conclusion of the finishing period the cattle were weighed onto a truck and taken to the Kansas City stock yards. Sale weights obtained in Kansas City were used to determine the shrink to market.

Observations

Complete gain and carcass data are summarized in Table 10. Feed consumption data for the finishing period are also included.

The soil profile of the pastures in Woodson county was classified by R. L. Goggins of the Soil Conservation Service as being typical of Dennis soils. This soil type generally develops on sandy shale.

Soil samples were analyzed in the soil testing laboratory of the Kansas State University Department of Agronomy. The analysis indicated that the soil was acidic (pH of 5.6) and also that the available phosphorus was rather low.

Forage samples were collected from the pastures by Dr. D. D. Parrish of the Kansas State Chemistry Department and Dr. K. C. Beeson of the U.S. Plant, Soil, and Nutrition Laboratory at Ithaca, N.Y., as part of a more comprehensive mineral study. Preliminary results indicate that the forages in the area may contain above-normal amounts of some trace elements and low amounts of others. Detailed results of the study are not yet available.

Feeds used in the feedlot phase of the study were analyzed for trace minerals by the Calcium Carbonate Company, Carthage, Mo. The corn grain was rather low in cobalt content (0.07 part per million). Since corn grain made up the major portion of the finishing ration, the total ration was also rather low in cobalt. However, the daily requirement for cobalt is very low compared with most other minerals.

1. Trace mineral salt furnished by Morton Salt Company, Chicago, Ill.
2. Stilmplants furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
3. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.

During the first grazing season, May 6 to October 10, 1958, both groups of steers made essentially the same total gain. Performance of the two groups during the winter period, October 10, 1958, to May 4, 1959, was also quite similar. The control animals as well as those receiving trace mineral salt just about maintained a constant body weight during the period.

At the end of the second grazing season, August 1, 1959, steers receiving trace minerals averaged 8 pounds per head heavier than control calves. During the period from May 4 to August 1 they gained an average of 203 pounds per head while the control group had an average gain of 192 pounds. This difference in favor of the steers receiving trace mineral salt was not statistically significant.

The cattle were weighed off pasture onto a trailer-truck and hauled directly to Manhattan (134 miles). On arrival at Manhattan they were again weighed. The control steers showed an average shrink of 47.5 pounds (5.3%) during the trip, while the steers receiving trace mineral salt showed an average shrink of only 25.8 pounds (2.9%). During the following week the control calves showed a further loss of 16 pounds each and those receiving trace mineral salt a further loss of only 11 pounds each.

Both groups of steers made satisfactory gains during the finishing period. Calves receiving trace mineral salt gained an average of 0.26 pound more per day than controls. However, gains of individual calves within groups varied greatly. Therefore, this large difference in average daily gain between groups was not statistically significant.

A summary of the over-all gains from May 6, 1958, to November 6, 1959, shows that calves receiving trace mineral salt averaged 56 pounds heavier than control calves at the end of the period. However, here again the great difference between gains of individuals within each group causes one to question the validity of the average figures. This is especially true because of the small number of animals involved.

Shrink was again measured when the cattle were shipped to market (125 miles). Control calves showed an average shrink of 65 pounds (5.7%) while those receiving trace minerals showed an average shrink of only 54 pounds (4.5%). All cattle were handled the same and rode in the same truck.

When viewed with other data accumulated at this station, the feeding of trace minerals in a finishing ration based on corn certainly appears to have some value. Results with rations based on sorghum grain have generally been less favorable and inconsistent. Pasture tests conducted up to now have not shown that trace mineral supplementation increases pasture gains.

Further work is being carried on in an effort to determine which specific trace minerals might be involved and also to determine under what specific feeding conditions trace mineral supplementation might be of value in increasing gain and reducing shrink.

Table 10

Trace mineral salt for steers on pasture and in the fattening lot.

Phase 1—Grazing—May 6, 1958, to October 10, 1958—157 days.

Treatment	Control	T. M. salt
Number of steers	12	12
Av. initial wt., lbs.	551	550
Av. final wt., lbs.	701	697
Av. total gain, lbs.	150	147
Av. daily gain, lbs.	0.96	0.94
Phase 2—Wintering—October 10, 1958, to May 4, 1959—206 days.		
Av. initial wt., lbs.	701	697
Av. final wt., lbs.	697	694
Av. total gain, lbs.	−4	−3
Phase 3—Grazing—May 4, 1959, to August 1, 1959—89 days.		
Av. initial wt., lbs.	697	694
Av. final wt., lbs.	889	897

Table 10 (Continued)

Av. total gain, lbs.	192	203
Av. daily gain, lbs.	2.16	2.28
Standard error of mean	±0.15	±0.13
Phase 4—Finishing—August 1, 1959, to November 6, 1959—90 days.		
Number of steers	12	11[1]
Av. initial wt., lbs.	826	859
Av. final wt., lbs.	1143	1199
Av. total gain, lbs.	317	340
Av. daily gain, lbs.	3.52	3.78
Standard error of mean	±0.15	±0.26
Av. daily ration, lbs.:		
Ground corn	18.2	20.3
Soybean oil meal	1.0	1.0
Prairie hay	7.1	7.4
Salt	0.07	0.06
Salt + bonemeal	0.03	0.04
Av. feed per cwt. gain, lbs.:		
Ground corn	517	537
Soybean oil meal	28.4	26.5
Prairie hay	201.7	195.8
Salt	1.98	1.59
Salt + bonemeal	0.85	1.06
Feed cost per cwt. gain	$13.93	$14.28
Carcass grade, USDA:		
Low choice	3	1
High good	2	2
Av. good	1	3
Low good	4	5
High standard	2	0
Av. USDA grade[2]	11.0	10.9
Av. marbling score[3]	7.50	7.45
Av. firmness score[4]	4.25	4.0
Av. fat thickness, in.[5]	0.60	0.60
Av. ribeye, sq. in.[5]	12.02	12.89
SUMMARY—May 6, 1958, to November 6, 1959—549 days.		
Av. initial wt., lbs.	551	550
Av. final wt., lbs.	1143	1199
Av. total gain, lbs.	592	649
Av. daily gain, lbs.	1.08	1.19
Standard error of mean	±0.04	±0.05

1. One steer died September 6, 1959.

2. Average grade determined as follows: Low choice, 13; high good, 12; av. good, 11; low good, 10; high standard, 9.

3. Visual marbling score: moderate, 5; modest, 6; small amount, 7; slight amount, 8.

4. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.

5. Measured at the 12th rib.

Cobalt "Bullets"[1 2] for Beef Cattle. Project 430. Progress Report

B. A. Koch, E. F. Smith, D. Richardson, and R. F. Cox

Earlier work at this station indicated that supplemental trace minerals may be of value in some instances. Introduction of the so-called cobalt "bullet" has made it possible to study one of these trace minerals alone as a dietary supplement.

When the cobalt "bullet" is introduced into the fore part of the ruminant

1. Permaco cobalt "bullets" supplied by Nicholas International, Ltd., Toronto, Ontario, Canada.

2. Each "bullet" weighed 20 grams and contained 90% of cobalt oxide.

stomach (rumen), it remains there and slowly releases its cobalt. The cobalt requirement of cattle is very small (approximately 0.03 to 0.05 mg. per pound of feed) but this small amount is very important, since the rumen bacteria need it in the production of vitamin B_{12} needed by animals.

Procedure

It is possible to superimpose a study of this type on another basic study by giving half the animals in each treatment group a cobalt "bullet." Thus additional research information is obtained without increasing the number of animals or the facilities. This technique was applied with four different studies reported here. The cattle used, specific test conditions, and diets are detailed in those reports. Cattle involved are those receiving supplemental enzymes in their diet composed primarily of corn grain, those receiving corn grain artificially dried at different temperatures, those receiving either cracked or pelleted sorghum grain, and those receiving whole plant grain sorghum silage or pellets made from green grain sorghum plant.

Each cobalt "bullet" weighed 20 grams and contained 18 grams of cobalt oxide when placed in the digestive tract of the animal. All treated animals were given one cobalt bullet each with a balling gun in early December, 1959. The supplier priced the "bullets" at $1.60 each.

Observations

This is a progress report; final conclusions will be made after the cattle reach slaughter weight. Each individual animal will be followed through slaughter and complete carcass data will be collected.

The additional cobalt apparently is not stimulating gain of cattle receiving sorghum grain. The cattle receiving sorghum grain are also receiving rations rather high in roughage content.

Cobalt supplementation apparently is increasing gains in both groups of cattle receiving corn grain. Their fattening ration is rather low in roughage content.

The cattle receiving a pound of alfalfa hay per day apparently are not responding so much to the supplemental cobalt as those receiving only sorghum silage as roughage.

Table 11
Cobalt "bullets" for beef cattle—Progress Report—Project 430.

Item	Supplemental enzymes with corn		Artificially dried corn		Cracked or pelleted sorghum grain		Grain sorghum silage or pellets	
Treatment	Control	Cobalt	Control	Cobalt	Control	Cobalt	Control	Cobalt
Animals per treatment	15	15	15	15	10	10	10	10
Days on test	112	112	112	112	112	112	112	112
Av. initial wt., lbs.	467	466	463	469	558	564	566	554
Av. total gain, lbs.	195	213	184	216	204	206	212	210
Av. daily gain, lbs.	1.74	1.90	1.64	1.93	1.82	1.84	1.89	1.88
Standard error of mean	±0.04	±0.06	±0.03	±0.08	±0.10	±0.07	±0.12	±0.09
Av. daily ration, lbs.:								
Cracked corn	10.0	10.0	10.0	10.0				
Soybean oil meal	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alfalfa hay	1.0	1.0	0	0	1.3	1.3		
Atlas sorghum silage	10.0	10.0	10.0	10.0	28.0	28.0		
Sorghum grain					4.0	4.0		
Dehyd. alfalfa pellets							1.0	1.0
Grain sorghum silage or pellets							37.6 or 13.2	37.6 or 13.2

A Comparison of Salt-protein Blocks and Salt-protein Loose Mixtures with and without Additional Phosphorus, 1958-59 (Project 253-1).

E. F. Smith, F. W. Boren, and B. A. Koch

Salt-meal mixtures, with enough salt to limit protein intake, have been used for some time to supply protein on a self-service basis to range cattle. By pressing the salt-protein mixture into block form, there is the possibility of limiting intake mechanically and thereby reducing the salt content of the mixture which would be desirable.

In addition to comparing protein supplied in block form with that supplied by a salt-meal mixture, the value of additional phosphorus supplied in the form of bonemeal was also studied.

The following experimental treatments were compared:

Pasture 1. Salt and soybean meal in block form.
Pasture 2. Salt, soybean meal, and phosphorus in block form.
Pasture 3. Salt and soybean meal mixture.
Pasture 4. Salt, soybean meal, and phosphorus mixture.

The mixtures or blocks listed above were kept before the animals throughout the winter period. The salt content of the blocks varied from 10 to 20 percent; molasses was included as a binding agent in the blocks, so equal quantities were included in the mixtures. When bonemeal was omitted from the ration, sorghum grain was substituted to make the total feed consumed comparable.

The bluestem pastures had large amounts of mature dried grass on them; each was 60 acres in size, and an attempt was made to equalize the pastures by rotating the animals each 30 days. The experimental treatments for the animals remained the same.

The 40 heifer calves, 10 per treatment, used in the experiment were good to choice quality Herefords from near Fort Davis, Texas, and were assigned randomly according to weight to their treatments.

The experimental treatments were discontinued April 18 but the heifers continued on grass until July 23.

Observations

Salt content in both blocks and loose mixtures was varied in attempting to maintain consumption of the supplemental feed at the same level for all lots. Salt content of the blocks varied from 10 to 20 percent and that of the loose mixtures from about 15 to 25 percent. Salt required to control intake of supplemental feed in block form was 0.29 pound per head daily (lots 1 and 2) compared with an average of 0.49 pound per heifer daily (lots 3 and 4) for those on the loose mixture. Most of the difference occurred early in the feeding period when the heifers readily consumed the salt-meal mixtures but were not accustomed to the blocks.

The only variable in animal response among any of the treatments was the somewhat depressed gain of the pasture heifers fed the salt-protein-phosphorus mixture, which would seem to indicate the salt-protein-phosphorus block fed to pasture 2 was superior; however, the gains were about the same in the comparison of the block and mixture where additional phosphorus was omitted in lots 1 and 3. In these trials, it is doubtful if any difference in animal response between blocks and mixtures was obtained.

Additional phosphorus supplied in the form of bonemeal failed to improve animal performance.

Table 12

A comparison of salt-protein blocks and loose salt mixtures with and without additional phosphorus.

Pasture number	1	2	3	4
Treatment	Salt-protein block	Salt-protein block plus phosphorus	Salt protein, loose mixture	Salt protein, loose mixture plus phosphorus
Wintering—December 16, 1958, to April 18, 1959—137 days.				
Number heifers	10	9[1]	9[1]	10
Initial wt. per heifer, lbs.	447	444	449	446
Gain per heifer	—5	—2	—5	—28
Daily gain per heifer	— .04	— .01	— .04	— .20
Daily ration per heifer, self-fed, lbs.:				
Soybean meal	1.31	1.19	1.36	1.26
Salt	.30	.28	.52	.46
Molasses	.09	.09	.07	.07
Ground sorghum grain	.19		.21	
Bonemeal		.18		.19
Total	1.89	1.74	2.16	1.98
Bluestem pasture	Free choice			
Feed cost per heifer[2]	$10.93	$11.21	$11.55	$11.87
Grazing—April 18, 1959, to July 23, 1959—96 days.				
Initial wt. per heifer, lbs.	442	442	444	418
Gain per heifer	162	153	161	161
Daily gain per heifer	1.69	1.59	1.68	1.68
Grazing cost per heifer	$14.00	$14.00	$14.00	$14.00
Summary—December 2, 1958, to July 23, 1959—233 days.				
Initial wt. per heifer, lbs.	447	444	449	446
Final wt. per heifer, lbs.	604	595	605	579
Gain per heifer	157	151	156	133
Daily gain per heifer	.67	.65	.67	.57
Feed cost per heifer	$24.93	$25.21	$25.55	$25.87
Feed cost per cwt. gain	$15.88	$16.69	$16.38	$19.45

1. One heifer removed from pasture 2 because of pregnancy and one from pasture 3 due to unthriftiness.
2. Feed prices used are on inside back cover.

A Comparison of Dry Rolled and Steam Rolled Sorghum Grain, 1959 (Project 253-2).

E. F. Smith, D. Richardson, B. A. Koch, and F. W. Boren

Good to choice quality yearling Hereford heifers originating near Fort Davis, Texas, were used in the trial. They had been on bluestem pasture prior to the test and were allotted to treatments on the basis of prior treatment and weight.

The two lots were fed in an identical manner except one lot received dry rolled sorghum grain (resembling cracked grain, as rollers were set to crack rather than roll the grain) and the other lot received steam rolled grain. Some difficulty was encountered in removing sufficient moisture from the steam rolled grain after rolling to prevent it from heating.

Observations

Results are reported in Table 13. The two treatments produced only minor differences. Results of this test indicate that steam rolled grain is about equal to dry rolled grain for fattening yearling heifers. However, due to failure to remove sufficient moisture from the steam rolled grain after it was rolled, part of it heated and developed a musty aroma which may have affected test results.

Table 13

A comparison of dry rolled and steam rolled sorghum grain.
July 25 to November 6, 1959—104 days.

Treatment	Dry rolled grain	Steam rolled grain
Lot number	15	17
Number heifers	9[1]	9
Initial wt. per heifer, lbs.	604	602
Gain per heifer	260	251
Daily gain per heifer	2.50	2.41
Daily ration per heifer, lbs.:		
Sorghum grain, self-fed	17.3	17.1
Soybean meal	1.5	1.5
Prairie hay	4.7	4.8
Ground limestone	0.1	0.1
Salt	0.06	0.04
Feed per cwt. gain:		
Grain	692	708
Soybean meal	60	62
Prairie hay	188	199
Dressing percentage	58.6	58.9
Av. carcass grade[2]	16.7	16.6
Marbling score[3]	7.7	7.9

1. Ten heifers were in this lot originally; one was removed due to poor health.

2. The USDA grade low good was assigned a numerical value of 16; average good, 17.

3. Degree of marbling: A score of 7 indicates small amount, 8 indicates slight amount. The higher the score, the less marbling.

A Comparison of Feeding Hay to Heifers on Bluestem Pasture and in Drylot, 1958-1959. Project 253-2.

E. F. Smith, D. L. Good, B. A. Koch, and F. W. Boren

This study was designed to evaluate mature dry winter pasture for animals fed all of the harvested roughage such as hay that they would consume. In addition one group of animals wintered in drylot were moved to pasture one month prior to the start of the summer growing season to study their adjustment to pasture.

The following experimental treatments were used:

Lot 8—Wintered in a 139-acre bluestem pasture from December 1, 1958, to April 30, 1959, and fed all of the prairie hay they would eat with 4 to 6 pounds of alfalfa hay per head daily.

Lot 18—Wintered in a drylot 50 by 120 feet in size from December 1, 1958, to April 30, 1959, and fed hay in the same manner as lot 8.

Lot 18A—Wintered in a drylot 50 by 120 feet in size from December 1, 1958, to March 30, 1959, and fed hay in the same manner as lot 8 and lot 18. From December 1, 1958, to March 30, 1959, these animals were wintered with lot 18; from March 30, 1959, to April 30, 1959, they were in the same pasture as lot 8.

Observations

The results of this test are reported in Table 14.

Feeding hay to heifers on pasture reduced their hay intake as compared to drylot feeding.

Those fed hay on pasture gained less than those fed in drylot, and those moved to pasture one month before the grazing season also gained less than those kept in drylot.

The heifers in this test were grazed together during the summer following the winter period. The combined winter and summer gains in pounds per head daily were: lot 8, 0.66; lot 18, 0.75; lot 18A, 0.71. None of these gains were significantly different when statistically analyzed.

Table 14

A comparison of feeding hay to heifers in drylot and on pasture.
December 1, 1958, to April 30, 1959—150 days.

Lot number	8	18	18A
Number heifers per lot	10	10	10
Feeding area	Bluestem pasture	Drylot	Bluestem pasture and drylot
Initial wt. per heifer, lbs.	493	497	497
Gain per heifer, lbs.	12	87	45
Daily gain per heifer, lbs.	0.08	0.58	0.30
Standard error of mean	±0.06	±0.06	±0.05
Daily ration per heifer, lbs.:			
Alfalfa hay	4.6	4.9	4.6
Prairie hay	7.7	9.8	8.9
Bluestem pasture	Yes	No	Month of April only
Mineral (2 parts bonemeal, 1 part salt)	0.18	0.06	0.06

A Comparison of Wintering in Drylot with Wintering on Bluestem Pasture for Yearling Steers on a Wintering, Grazing, and Fattening Program, 1958-1959. Project 253-4.

E. F. Smith, F. W. Boren, and B. A. Koch

This is the third trial in a series designed to study the effect of winter management on performance of yearling steers. The first trial was reported in Circular 349 and the second in Circular 371 from this station. Yearlings consume large quantities of feed compared with calves, and cost of production is increased accordingly. This study is concerned with lowering the cost of wintering by introducing the use of low-cost, low-quality winter grass and observing its effect on future performance, especially with regard to the effect on the carcass.

Experimental Procedure

Twenty head of yearling Hereford steers, grading about high good on the basis of USDA feeder grades, were used in the test. They came from near Fort Davis and Paducah, Texas, and were allotted into two lots on the basis of origin and weight. They were the heavy end of the calves purchased in the fall of 1958 and were about one year old when started on the test. The only difference in treatment of the two lots was during the winter period; the treatment for the two lots was as follows:

Lot 12. Wintered on bluestem pasture supplemented with 5 pounds of alfalfa hay per head daily; bluestem pasture from April 30 to July 23: fed grain on grass from July 23 to November 14 and grain in drylot from November 14, 1959, to January 8, 1960.

Lot 23. Wintered in drylot on prairie and alfalfa hay and then handled for the remainder of the test in an identical manner to lot 12.

Observations

1. The difference in winter management produced a significant difference in winter gain, which was reduced somewhat during the summer and fattening phase, but in total gain for all phases the steers wintered in drylot gained 32 pounds per head more than those wintered on pasture. This was a statistically significant difference. In addition, they had a higher dressing percentage and produced slightly superior carcasses.

2. Except for the gain and possibly the dressing percentage, the overall differences produced by the two treatments were somewhat small but in every case it favored steers wintered under drylot conditions.

Table 15

A comparison of wintering in drylot with wintering on dry bluestem pasture for yearling steers on a wintering, grazing, and fattening program, 1958-59.

Lot number	12	23
Phase 1, Wintering, December 9, 1958, to April 30, 1959—142 days.		
Place wintered	Bluestem pasture	Drylot
Initial wt. per steer, lbs.	612	608
Gain or loss per steer, lbs.	−60	73
Daily gain or loss per steer, lbs.	−0.42	0.51
Feed per steer daily, lbs.:		
Alfalfa hay	5.0	5.0
Prairie hay		13.6
Bluestem pasture	Yes	No
Mineral (bonemeal and salt)	0.10	0.11
Feed cost per steer[1]	$ 9.44	$18.80
Phase 2, Grazing, April 30, 1959, to July 23, 1959—84 days.		
Gain per steer, lbs.	219	141
Daily gain per steer	2.61	1.68
Phase 3, Fattening, July 23, 1959, to January 8, 1960—169 days.		
Final wt. per steer, lbs.	1213	1241
Gain per steer	442	419
Daily gain per steer	2.62	2.48
Standard error of mean	±0.11	±0.10
Daily ration per steer, lbs.:		
Ground shelled corn	14.3	14.3
Soybean meal	1.5	1.5
Alfalfa hay[2]	1.4	1.4
Bluestem pasture[3]	July to November	
Ground limestone	0.07	0.07
Salt	0.06	0.06
Feed per cwt. gain, lbs.:		
Corn	547	577
Soybean meal	57	61
Alfalfa hay	54	57
Feed cost per steer[1]	$84.08	$84.08
Feed cost per cwt. gain	$19.02	$20.07
Summary of Phases 1, 2, and 3, December 9, 1958, to January 8, 1960—395 days.		
Total gain per steer, lbs.	601	633
Daily gain per steer, lbs.	1.52	1.65
Standard error of mean	±.04	±.04
Feed cost per cwt. gain[1]	$15.56	$16.25
Total feed cost per steer	$93.52	$102.88
Sale price per cwt., live wt., based on carcass value[4]	$24.39	$24.82
Loss per steer above initial cost plus feed cost	$14.53	$10.77
Dressing percentage	59.1	60.6
Carcass grade[5]	16.6	17.4
Marbling score[6]	7.7	7.2

1. Feed prices may be found inside back cover.

2. Alfalfa hay was fed only when the steers were in drylot, about 4 pounds per head daily from November 14, 1958, to January 8, 1959.

3. The two lots were fed grain on grass from July 23 to November 14, when they were moved to drylot.

4. Hot carcass weights were shrunk 2% and evaluated per cwt. as follows: Standard, $38.50; good, $42; choice, $44.50. These lot carcass values were then divided by the home weight, less 3%, to arrive at a live price per cwt.

5. A numerical value of 16 is low good; 17, av. good; and 18, high good.

6. Marbling score based on: small amount, 7; slight amount, 8.

Different Methods of Managing Bluestem Pastures, 1959. Projects 253-3 and 253-5.

E. F. Smith, K. L. Anderson, B. A. Koch, F. W. Boren, and B. D. Carmack

This experiment was designed to determine the effect of different stocking rates, of deferred grazing, and of pasture burning on cattle performance, productivity of pastures, and range condition as determined by plant population changes. In addition to the yearly report, a summary of cattle gains for the past 10 years of the study is included.

Experimental Procedure

Yearling Hereford steers with an average USDA feeder grade of high good were used in 1959. They were purchased as calves from near Fort Davis, Texas, and during the winter prior to summer grazing were grazed on bluestem range supplemented with about 7 pounds of alfalfa hay per steer daily. In addition to the steers a limited number of heifer yearlings were used to stock the different pastures—to increase the stocking rate. Gains of the heifers are not reported. They remained on the pastures only from May 5 to July 24, 1959.

The experimental treatment for each pasture was:

Pasture 1. Moderate stocking rate, 3.2 acres per head (5 acres per animal unit).

Pasture 2. Overstocked, 2.2 acres per head (3.75 acres per animal unit).

Pasture 3. Understocked, 5.0 acres per head (7.5 acres per animal unit).

Pastures 4, 5, and 6. Deferred grazing at the moderate stocking rate, 3.1 acres per head. All steers were held on pastures 5 and 6 from May 5 to June 30. They were then moved to pasture 4 where they remained until October 1. From October 1 until November 2 the steers were grazed on pastures 5 and 6.

Pasture 9. Burned March 21, 1959, moderate rate of stocking.

Pasture 10. Burned April 10, 1959, moderate rate of stocking.

Pasture 11. Burned April 30, 1959, moderate rate of stocking.

Part of the steers, about 50% in each pasture, were implanted with 24 mgs. of stilbestrol.

Observations

The results are presented in Tables 16 and 17.

Early-spring burning and overstocking have reduced the forage produced on these pastures. It was possible to burn only about 75% of the early-spring-burned pasture because of reduced forage. Sufficient grass was present on the mid- and late-spring-burned pastures to burn them completely.

Steer gain per head was increased by mid- and late-spring burning and reduced under deferred grazing. The other treatments produced only slight variations in daily gain.

Burning and grazing are significantly affecting vegetational makeup as shown in Table 18, a summary of plant populations on major range sites.

Table 16

A comparison of different methods of managing bluestem pastures.
May 5, 1959, to November 2, 1959—181 days.

Pasture number	1	2	3	4, 5, 6	9	10	11
Management	Normally stocked	Over-stocked	Under-stocked	Deferred	Early-spring-burned	Mid-spring-burned	Late-spring-burned
Number animals per pasture:							
Steers	17	21	11	50	12	12	12
Heifers[2]	2	6	2	9	2	2	2
Acres in pasture	60	60	60	3-60[1]	44	44	44
Acres per head	3.2	2.2	5.0	3.1	3.1	3.1	3.1
Initial wt. per steer, lbs.	461	462	464	467	463	468	472
Final wt. per steer, lbs.	713	703	726	670	717	743	767
Gain per steer, lbs.	252	241	262	203	254	275	295
Daily gain per steer, lbs.	1.39	1.33	1.45	1.12	1.40	1.52	1.63
Gain per acre, lbs.	79	110	52	65	82	89	95

1. Three 60-acre pastures.
2. The heifers were used to increase the stocking rate; their gains are not reported. They were removed from the pastures July 24.

Table 17

Yearly account of cattle gains under different methods of grazing pastures; 10-year summary, 1950-1959. Average gain per steer in pounds for the summer season of approximately 150 days.

Pasture number	1	2	3	4, 5, 6	9	10	11
Management	Normally stocked	Over-stocked	Under-stocked	Deferred rotated	Early-spring-burned	Mid-spring-burned	Late-spring-burned
1950	221	210	214	205	216	254	230
1951	242	256	290	234	243	265	254
1952	246	209	228	197	251	278	283
1953	226	194	233	197	205	217	234
1954	261	237	236	214	270	271	306
1955	270	224	253	213	282	305	307
1956	179	184	168	154	212	234	216
1957	243	236	244	209	261	256	279
1958	208	207	207	198	223	270	253
1959	252	241	262	203	254	275	295
Average	**235**	**220**	**234**	**202**	**242**	**263**	**266**

Table 18

Vegetational composition by major groups of plants in major range sites. Amounts given are percentages of total population for 1959.

Treatment	Total[1] big bluestem, little bluestem, indiangrass	Total perennial grass increasers	Total veg. other than perennial grass
Ordinary upland range site			
Not burned	% 35	% 34	% 30
Heavy stocking	56	23	19
Moderate stocking	52	25	21
Light stocking	54	25	15
Def.-rot. grazing[2]			
Burned (moderate stocking)	46	28	25
Early spring	71	13	15
Mid-spring	75	15	8
Late spring			
Limestone breaks range site			
Not burned	% 46	% 24	% 28
Heavy stocking	68	18	13
Moderate stocking	65	18	15
Light stocking	72	17	10
Def.-rot. grazing[3]			
Burned (moderate stocking)	54	21	24
Early spring	72	18	8
Mid-spring	75	15	9
Late spring			
Clay range sites[4]			
Not burned	% 27	% 38	% 31
Heavy stocking	30	36	31
Moderate stocking	35	46	17
Light stocking	38	36	15
Def-rot. grazing[3]			
Burned (moderate stocking)	6	79	21
Early spring	8	82	10
Mid-spring	17	67	9
Late spring			

1. The two bluestems and indiangrass are the most abundant grasses in these pastures that decrease under heavy grazing pressure.
2. These include the gramas, buffalograss, bluegrass, and others that increase under grazing pressure.
3. Average of pastures 4, 5, and 6.
4. Clay upland sites in the pastures not burned but claypan sites in those burned. The latter are somewhat more restrictive in terms of moisture and plant growth.

Stilbestrol Implants[1] for Steer Calves on a Wintering, Grazing, and Fattening Program; the Value of Aureomycin[2] during the Wintering and Fattening Periods, 1958-1959 (Project 253-6).

E. F. Smith, B. A. Koch, F. W. Boren, and B. D. Carmack

The Hereford steer calves used in this experiment were assigned to experimental lots randomly according to weight. They originated near Paducah, Texas, and graded USDA Good as feeders. All received the same basic ration from December 1, 1958, to April 28, 1959. They were grazed on bluestem pasture from April 28, 1959, to July 24, 1959, and were self-fed grain on grass from July 24 to November 14, 1959.

1. The stilbestrol implants were supplied by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
2. The Aureomycin was supplied by the American Cyanamid Company, Pearl River, N.Y.

This is the second trial of this experiment. The first is reported on page 22, Circular 371.

The experimental treatment was as follows:

Lot 22. Control group of 10 steer calves implanted with 24 mgs. of stilbestrol August 1, 1959.

Lot 19. Ten steer calves implanted with 24 mgs. of stilbestrol May 7, 1959.

Lot 20. Twelve steer calves, all implanted with 24 mgs. of stilbestrol December 2, 1958; four were reimplanted with 24 mgs. of stilbestrol May 7, 1959, and four others were reimplanted August 1, 1959, leaving only four with the original fall implant. See Table 19 for gains of different implant groups.

Lot 21. Twelve steer calves received the same treatment as lot 20 except for receiving 70 mgs. of Aureomycin per head daily during wintering and fattening phases.

Observations

Results of this test are reported in Tables 19 and 20. In Table 19 a 24-mg. stilbestrol implant increased winter gain slightly; 70 mgs. of Aureomycin fed to implanted animals tended to further increase gains. The stilbestrol-Aureomycin combination produced 0.24 pound more gain per head daily during the winter and slightly reduced feed required for 100 pounds of gain.

Table 20 shows the results of implanting steers with stilbestrol in the fall, spring, and at mid-summer before fattening. A 24-mg. implant in the spring following a fall implant did not increase summer gains. Steers implanted in the spring for the first time tended to gain slightly more during the summer than those previously implanted or those not implanted.

A fall implant tended to lose its effect by August, when the fattening period started.

Previous implants slightly increased gains during the fattening period.

As shown in Table 19, three implants tended to lower carcass grade. Aureomycin in the fattening ration increased both gains and carcass grade of steers implanted at three different dates: fall, spring, and mid-summer.

Table 19

Stilbestrol implants for steer calves on a wintering, grazing, and fattening program; the value of Aureomycin during wintering and fattening periods.

Phase 1—Wintering—December 1, 1958, to April 28, 1959—148 days.				
Lot number	22	19	20	21
Number steers	10	10	12	12
Treatment	Control—Stilbestrol implant Aug. 1, 1959	Stilbestrol implant May 7, 1959	Stilbestrol implant Dec. 2, 1958[1]	Stilbestrol implant Dec. 2, 1958[1] and Aureomycin[2]
Initial wt. per steer, lbs.	488	489	494	495
Gain per steer	265	267	284	302
Daily gain per steer	1.79	1.80	1.92	2.04
Daily ration per steer, lbs.:				
Sorghum grain	4.8	4.8	4.8	4.8
Soybean meal	0.5	0.5	0.5	0.5
Sorghum silage	24.1	24.0	25.7	25.2
Alfalfa hay	3.0	3.0	3.0	3.0
Bonemeal	0.1	0.1	0.1	0.1
Stilbestrol implants, 24-mg.[1]	No	No	Yes	Yes

1. All steers in lots 20 and 21 were implanted with 24 mgs. stilbestrol December 2, 1958; four were reimplanted May 7, 1959, with 24 mgs., and four were reimplanted August 1, 1959. See Table 20 for gains by phases of each implanted group.

Table 19 (Continued)

Aureomycin, 70 mgs. per head daily[2]	No	No	No	Yes
Salt, free choice				
Feed per cwt. gain, lbs.:				
Sorghum grain	266	264	248	234
Soybean meal	28	28	26	25
Sorghum silage	1345	1330	1334	1235
Alfalfa hay	168	166	156	147
Feed cost per cwt. gain[3]	$11.34	$11.24	$10.79	$10.09
Phase 2—Grazing—April 28, 1959, to July 24, 1959—87 days.				
Initial wt. per steer	753	756	778	797
Gain per steer	37	55	40	40
Daily gain per steer	0.43	0.63	0.46	0.46
Stilbestrol implants, 24-mg.	No	Yes	See footnote No. 1	
Phase 3—Fattening—July 24, 1959, to November 14, 1959—113 days.				
Initial wt. per steer	790	811	818	837
Gain per steer	297	291	282	317
Daily gain per steer	2.63	2.58	2.50	2.81
Daily ration per steer, lbs.:				
Ground corn, self-fed	16.4	16.9	16.9	17.8
Soybean meal	1.5	1.5	1.5	1.5
Ground limestone	0.1	0.1	0.1	0.1
Salt, free choice				
Bluestem pasture, free choice				
Stilbestrol implants, 24-mg.	Yes	Implanted May 7	See footnote No. 1	
Aureomycin, 70 mgs. per head daily	No	No	No	Yes
Feed per cwt. gain:				
Ground corn	624	657	657	635
Soybean meal	57	58	58	53
Feed cost per cwt. gain[3]	$18.72	$19.51	$20.13	$18.68
Summary of Phases 1, 2, and 3—December 1, 1958, to November 14, 1959—348 days.				
Final wt. per steer, lbs.	1087	1102	1100	1154
Gain per steer, all phases	599	613	606	659
Daily gain per steer	1.72	1.76	1.74	1.89
Feed cost per steer[3]	$ 92.64	$ 93.77	$ 94.41	$ 96.69
Feed cost per cwt. gain	$ 15.47	$ 15.30	$ 15.58	$ 14.67
Sale price per cwt., live wt., based on carcass value[4]	$ 23.78	$ 23.27	$ 22.83	$ 23.04
Return or loss per steer above feed cost and initial steer cost at 34¢ a lb.	$ −0.05	$ −3.59	$ −10.58	$ −0.89
Dressing percentage	59.4	59.0	58.2	58.6
Av. carcass grade, USDA[5]	16.9	16.8	15.8	16.7
Av. marbling score[6]	7.7	7.8	8.4	7.8

2. Aureomycin was mixed with the soybean meal and fed at the rate of 70 mgs. per head daily during the wintering and fattening phases.

3. Feed prices may be found inside back cover.

4. Sale price per cwt. was based on the following carcass value per cwt.: Choice, $41; good, $39; standard, $35.

5. The USDA grade, high standard, was assigned a numerical grade of 15; low good, 16; average good, 17.

6. Degree of marbling: A score of 7 indicates small amount, 8 indicates slight amount, and 9 indicates traces only. The higher the score, the less marbling.

Table 20

The effect of implanting steers with stilbestrol at different times during a wintering, grazing, and fattening program.

	Number of steers per treatment	Winter gain, Dec. '58 to Apr. '59, 148 days	Summer gain, Apr. '59 to July '59, 87 days	Fattening gain, July '59 to Nov. '59, 113 days	Total gain, Dec. '58 to Nov. '59, 348 days	Average carcass grade[1]
Implanted in December, 1958, with 24 mgs.	8[2]	297	48	278	623	16.5[2]
Implanted in December, 1958, and April, 1959, with 24 mgs. each time	7[2]	289	42	299	630	16.0[2]
Implanted in December, 1958; April, 1959; August, 1959, with 24 mgs. each time	8[2]	289	31	320	640	16.3[2]
Implanted in May, 1959, with 24 mgs.	10	267	55	291	613	16.8
Implanted in August, 1959	10	265	37	297	599	16.9

1. The USDA grade, low good, was assigned a numerical score of 16; average good, 17.

2. Half of the animals in each implant group are from lot 20 and half from lot 21, except where seven steers are listed; one steer in this group from lot 20 died.

The Value of Diethylstilbestrol Implants[1] and Implants plus an Antibiotic[2] for Wintering Steer Calves, 1959-60.

E. F. Smith, B. A. Koch, D. Richardson, and F. W. Boren

Forty-four good-to-choice Hereford steer calves from near Fort Davis, Texas, were randomly allotted according to weight to three treatments. All lots were fed the same high roughage rations. They received per head daily: 5 pounds of sorghum grain and 1 pound of soybean meal. Sorghum silage was fed according to appetite, and salt was offered free choice.

The experimental treatments were as follows:

Lot 1. Control.

Lot 2. Each steer implanted with 24 mgs. of diethylstilbestrol in the right ear.

Lot 3. Each steer implanted with 24 mgs. of diethylstilbestrol in the right ear and fed 70 mgs. of Aureomycin per head daily. The Aureomycin was added to the soybean meal.

The animals in this experiment will be grazed and fattened during the summer and fall of 1960; some will be reimplanted with diethylstilbestrol to collect more information on its use in a wintering, grazing, and fattening program.

Observations

Weight gains and feed efficiency of steers on high roughage rations were increased by the use of a 24-mg. diethylstilbestrol implant given each steer in the ear. Including 70 mgs. of Aureomycin in the feed per steer daily in addition to the diethylstilbestrol implant resulted in further weight-gain increase and improved feed efficiency.

1. The diethylstilbestrol implants (Stimplants) were furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.

2. Chlortetracycline (Aureomycin) was furnished by American Cyanamid Company, Pearl River, N.Y.

Table 21

The value of diethylstilbestrol implants with and without chlortetracycline (Aureomycin) for wintering steer calves.

December 1, 1959, to March 25, 1960—115 days.

Treatment	Control	Diethyl-stilbestrol implant	Diethyl stilbestrol implant and Aureomycin
Lot number	1	2	3
Number steers	20	12	12
Initial wt. per steer, lbs.	520	524	523
Daily gain per steer, lbs.	1.46	1.61	1.84
Standard error of mean	± .05	± .08	± .09
Daily ration per steer, lbs.:			
Soybean oil meal	1.00	1.00	1.00
Sorghum grain	5.00	5.00	5.00
Sorghum silage	29.4	31.0	33.0
Salt, free choice	Yes	Yes	Yes
Diethylstilbestrol implant, 24-mg.	No	Yes	Yes
Aureomycin, 70 mgs. per head daily	No	No	Yes
Feed per cwt. gain, lbs.:			
Soybean oil meal	69	62	54
Sorghum grain	342	311	271
Sorghum silage	2013	1927	1790
Feed cost per cwt. gain[1]	$13.76	$12.74	$11.66

1. Feed prices may be found inside back cover.

Rolled vs. Finely Ground Pelleted Sorghum Grain in Cattle Rations. Project 567.

D. Richardson, E. F. Smith, B. A. Koch, F. W. Boren, and W. S. Tsien

This was the third test to further compare rolled or cracked sorghum grain with finely ground pelleted sorghum grain in cattle rations. Previous tests have shown increased rate of gain and feed efficiency when the grain was finely ground and pelleted.

Experimental Procedure

Twenty Hereford steer calves were divided as equally as possible on the basis of weight and conformation into two lots of 10 animals each. The average daily rations are shown in Table 22 for the wintering and fattening phases. The ingredients were the same in both lots except rolled grain was used in lot 1 and finely ground pelleted grain in lot 2. The concentrate part of the ration was kept constant, with all the roughage the animals would clean up.

Results and Observations

Results of the wintering and fattening phase, including a summary, are shown in Table 22. Weight gains and feed efficiency were improved in both the wintering and fattening phases by finely grinding and pelleting sorghum grain. Cost per unit of gain was less with pelleted grain, allowing $3 per ton for pelleting. The animals receiving the pelleted grain consumed less total feed per day. Since the amount of concentrates was kept constant, the difference was in roughage. Dressing percentage and carcass grades were highest for animals fed pelleted grain.

Table 22

Rolled sorghum grain vs. finely ground pelleted sorghum grain in steer rations.

Wintering phase, December 2, 1958, to March 12, 1959—100 days.

Lot number	1	2
Number steers per lot	10	10
Av. initial wt., lbs.	418	424

Table 22 (Continued)

Av. final wt., lbs.	568.5	586.5
Av. daily gain per steer, lbs.	1.51	1.63
Av. daily ration, lbs.:		
Alfalfa hay	4.0	4.0
Atlas sorghum silage	14.1	12.65
Rolled sorghum silage	14.1	12.65
Rolled sorghum grain	4.0	
Pelleted sorghum grain		4.0
Soybean oil meal	0.5	0.5
Salt	0.05	0.02
Bonemeal-salt mixture	0.06	0.04
Feed per cwt. gain, lbs.:		
Alfalfa hay	264.9	245.3
Atlas sorghum silage	933.8	776.1
Rolled sorghum grain	264.9	
Pelleted sorghum grain		245.3
Soybean oil meal	33.1	30.7
Salt	3.4	1.0
Bonemeal-salt mixture	4.0	2.4
Feed cost per cwt. gain[1]	$10.89	$10.16
Fattening phase, March 13, 1959, to October 7, 1959—209 days.		
Av. initial wt., lbs.	568.5	586.5
Av. final wt., lbs.	1013.5	1063.0
Av. daily gain per steer, lbs.	2.13	2.28
Av. daily ration, lbs.:		
Alfalfa hay	5.5	2.5
Atlas sorghum silage[2]	7.5	7.5
Dehydrated alfalfa pellets	0.5	0.5
Soybean oil meal	0.5	0.5
Rolled sorghum grain	13.5	
Pelleted sorghum grain		13.5
Salt	.07	.04
Bonemeal-salt mixture	.04	.04
Feed per cwt. gain, lbs.:		
Alfalfa hay	257.0	109.2
Atlas sorghum silage	200.0	187.3
Dehydrated alfalfa pellets	23.5	21.9
Soybean oil meal	23.5	21.9
Rolled sorghum grain	636.4	
Pelleted sorghum grain		594.3
Salt	3.2	1.7
Bonemeal-salt mixture	1.8	1.7
Feed cost per cwt. gain	$16.89	$15.94
Summary, Wintering and fattening, December 2, 1958, to October 7, 1959—309 days.		
Av. total gain, lbs.	595.5	639.0
Av. daily gain, lbs.	1.93	2.07
Av. feed cost per cwt. gain	$15.37	$14.47
Percent shrink to market	2.5	2.3
Av. dressing percentage (including 2% cooler shrink)	59.9	61.7
Av. carcass grade[3]	11.5	12.6
Av. degree of marbling[4]	7.2	6.7

1. Based on ingredient prices given on inside back cover.
2. Average for first 118 days. Removed from ration at this time.
3. Based on av. choice, 14; low choice, 13; top good, 12; av. good, 11; and low good, 10.
4. Based on modest amount, 6; small amount, 7; slight amount, 8.

The Value of Grain Sorghum Harvested as Silage and as Dehydrated Pellets. Project 567.

Progress Report

D. Richardson, E. F. Smith, F. W. Boren, B. A. Koch, and W. S. Tsien

This is a progress report of the second test to determine the value of the entire grain sorghum plant in beef cattle rations when harvested as silage or as dehydrated pellets. RS 610 was the hybrid used. The yield was about 85 bushels of grain or approximately 9 tons of silage per acre. The crop was harvested when the grain was in the late-dough stage. Most of the leaves were still green.

Twenty of the heaviest steer calves were equally divided into two lots of 10 each for this test. All animals received soybean oil meal, dehydrated alfalfa pellets, and minerals. One lot is receiving silage and the other dehydrated pellets in the amount that they will clean up. Table 23 gives the gains, feed efficiency, and cost of gain for the first 112 days.

Table 23

Grain sorghum silage vs. dehydrated grain sorghum pellets in steer rations.

December 3, 1959, to March 24, 1960—112 days.

Lot number	5	6
Number animals per lot	10	10
Av. initial wt., lbs.	561	560
Av. final wt., lbs.	788	755
Av. daily gain per animal, lbs.	2.03	1.74
Av. daily ration, lbs.:		
Grain sorghum silage	37.6	
Dehydrated grain sorghum pellets		13.2
Soybean oil meal	1.0	1.0
Dehydrated alfalfa pellets	1.0	1.0
Feed per cwt. gain, lbs.:		
Grain sorghum silage	1857	
Dehydrated grain sorghum pellets		757
Soybean oil meal	49	57
Dehydrated alfalfa pellets	49	57
Feed cost per cwt. gain	$12.58	$22.75

Artificially Dried Corn in Cattle Rations

Progress Report

D. Richardson, E. F. Smith, B. A. Koch, F. W. Boren, and W. S. Tsien

With improved harvesting machinery, grain is being harvested earlier. In many cases, this is done before the grain has dried sufficiently to be stored. This means that some method must be used to lower the moisture content to a safe level if the grain is to enter normal storage. There are ways of drying grain with and without heated air.

The wet milling industry has for many years had difficulty in processing corn artificially dried at high temperatures. Opinions vary about the effect drying grain has on its feeding value. Results of controlled work to evaluate any effect produced are scanty. This is a progress report of a test to study the effect on its feeding value for cattle of artificially drying corn. The corn was produced at the Courtland Irrigation Research Farm near Belleville. The drying was done by the Agricultural Engineering Department. All of the corn came from the same field. Three lots of 10 animals each are being used in this test. Sorghum silage is fed as the roughage and each animal receives 1 pound of soybean oil meal daily. Minerals and salt are fed free choice. The corn for each lot was dried as follows:

Lot 7. Harvested November 2, initial moisture 25%, final moisture 13.5%. Dried 394 hours with 1½-hp Butler natural air-drying system (no heat).

Note: Due to weather conditions, corn for lots 8 and 9 could not be harvested until November 24 and 30.

Lot 8. Harvested November 24, initial moisture 19.3%, final moisture 13.2%. Dried in 250-bushel Tox-O-Wik Batch Dryer with air heated to 180° F.

Lot 9. Harvested November 30, initial moisture 21.2%, final moisture 12.7%. Dried in 250-bushel Tox-O-Wik Batch Dryer with air heated to 230° F.

All corn was sacked and stored. It is ground as needed.

Observations

There was very little scorching of grain even at the highest temperature. However, corn dried with heated air, especially at the higher temperature, tended to lose some of its bright yellow color and also to separate from the outer coat upon cracking. The animals did not care for the corn dried at 230° F.; however, they started eating satisfactorily on the second day and no further trouble has been experienced. Animals in lots 8 and 9, fed corn dried at 180° F. and 230° F., respectively, did not gain so well the first 84 days as those in lot 7. However, there are no significant differences at present. The results for the first 112 days are shown in Table 24. The test will continue until the animals are marketed for slaughter.

Table 24

The effect of artificially drying corn.

December 10, 1959, to March 31, 1960—112 days.

Lot number	7	8	9
Number heifers per lot	10	10	10
Av. initial wt., lbs.	466.5	466.5	465.5
Av. final wt., lbs.	669.5	658.0	670.0
Av. daily gain per animal, lbs.	1.81	1.71	1.83
Av. daily ration, lbs.:			
Atlas sorghum silage	10.0	10.0	10.0
Corn—no supplemental heat	10.1		
Corn—dried at 180° F.		10.1	
Corn—dried at 230° F.			10.1
Soybean oil meal	1.0	1.0	1.0
Feed per cwt. gain, lbs.:			
Atlas sorghum silage	550	584	543
Corn—no supplemental heat	560		
Corn—dried at 180° F.		592	
Corn—dried at 230° F.			555
Soybean oil meal	55	58	55
Feed cost per cwt. gain	$15.75	$16.65	$15.63

The Value of Enzymes Added to Cattle Rations, Project Com. 5-662.[1] Progress Report

D. Richardson, B. A. Koch, E. F. Smith, F. W. Boren, and W. S. Tsien

Feed is stored nutrients for animals. The value of the feed depends on the nutrients it contains and the ability of animals to obtain these nutrients for their bodies to use. Enzymes are organic catalysts that have the primary responsibility of breaking down food so it can be absorbed and used. The more efficiently this work is done, the greater the value of the feed. This test is being conducted to determine the value of enzymes added to cattle-fattening rations.

Three lots of 10 animals each are being fed the same ration except for the added enzymes. The average daily ration is shown in Table 25, as are results of the test for the first 112 days. There are no significant differences in gains at present; however, lot 12, which receives a combination of enzymes that act upon carbohydrates and protein, has a slightly higher rate of gain. Animals in lot 12 also have a tendency to clean up their feed better than those in either other lot. This test will be continued until the animals are ready for slaughter.

1. We wish to acknowledge Rohm & Haas Company, Philadelphia, Pa., for partial support of this project and for supplying the enzymes.

Table 25

The value of enzymes added to cattle rations.

December 10, 1959, to March 31, 1960—112 days.

Lot number	10	11	12
		Added enzymes to act upon	
	Control	Carbohydrate	Carbohydrate + protein
Number heifers per lot	10	10	10
Av. initial wt., lbs.	466.0	466.0	467.0
Av. final wt., lbs.	666.5	668.5	676.0
Av. daily gain per animal, lbs.	1.79	1.81	1.87
Av. daily ration, lbs.:			
Alfalfa hay	1.0	1.0	1.0
Atlas sorghum silage	10.0	10.0	10.0
Corn	9.9	9.8	10.2
Soybean oil meal	1.0	1.0	1.0
Feed per cwt. gain, lbs.:			
Atlas sorghum silage	562.0	547.0	542.0
Alfalfa hay	52.0	52.0	50.0
Corn	555.0	543.0	546.0
Soybean oil meal	56.0	55.0	54.0
Feed cost per cwt. gain	$16.13	$15.80	$15.80

The Value of Grain Sorghum Harvested as Silage and as Dehydrated Pellets. Project 567.

D. Richardson, E. F. Smith, F. W. Boren, B. A. Koch, and W. S. Tsien

Combine-type sorghum grain is widely grown in Kansas, and normally only the grain is harvested. In many instances, moisture conditions at harvest time are such that the grain cannot be stored without artificial drying. Sometimes there is danger of losing immature grain because of early frost. This test was planned to study the value of the entire grain sorghum plant harvested as silage and as dehydrated pellets.

Experimental Procedure

Twenty Hereford steer calves from the same herd were divided as equally as possible on the basis of weight and conformation into two lots of 10 animals each. Grain sorghum (Martin) from the same field, estimated to yield 45 bushels per acre, was harvested half as silage and half as dehydrated grain sorghum pellets. The yield was approximately 6 tons silage or 2½ tons of dehydrated pellets per acre. The test involved a wintering and fattening phase. During the wintering phase, both lots received 4 pounds alfalfa hay, 0.5 pound soybean oil meal, and minerals free choice. Lot 1 received the dehydrated pellets and lot 2 received silage. Dry matter intake was maintained as near the same level as possible. At the end of the 100-day wintering phase, the hay was removed from the ration and replaced by 1 pound of dehydrated alfalfa pellets. The soybean oil meal was increased to 1 pound and the pellets and silage were increased to the quantity that the animal would clean up each day.

Results and Observations

Results of the wintering phase and the first 84 days of fattening are shown in Table 26. The fattening phase had to be terminated for the animals on silage at this time because of warm weather and excessive silage spoilage. Those receiving pellets continued for a total of 209 days with an over-all average daily gain of 1.93 pounds. The silage produced economical gains but the cost of dehydrating and pelleting made the gains very costly with the pellets. Weight gains were essentially the same for

the silage and pellets in both the wintering and fattening phase. Results indicate that one should not expect to produce cattle grading higher than good with this type ration.

Table 26

Dehydrated grain sorghum pellets vs. grain sorghum silage in steer rations.

Wintering phase, December 2, 1958, to March 12, 1959—100 days.

Lot number	1	2
Number steers per lot	10	10
Av. initial wt., lbs.	415.5	416.0
Av. final wt., lbs.	550.5	552.0
Av. daily gain per steer, lbs.	1.35	1.36
Av. daily ration, lbs.:		
Alfalfa hay	4	4
Dehydrated grain sorghum pellets	7.65	
Grain sorghum silage		20.5
Soybean oil meal	.5	.5
Salt	.04	.02
Bonemeal-salt mixture	.09	.06
Av. feed per cwt. gain, lbs.:		
Alfalfa hay	296.3	294.1
Dehydrated grain sorghum pellets	566.7	
Grain sorghum silage		1511.0
Soybean oil meal	37.0	36.8
Salt	2.6	1.3
Bonemeal-salt mixture	6.3	4.5
Feed cost per cwt. gain	$17.59	$10.86

Fattening phase, March 13 to June 4, 1959—84 days.

Av. initial wt., lbs.	550.5	552.0
Av. final wt., lbs.	719.0	716.5
Av. daily gain per steer, lbs.	2.0	1.96
Av. daily ration, lbs.:		
Dehydrated grain sorghum pellets	17.5	
Grain sorghum silage		37.7
Soybean oil meal	1.0	1.0
Dehydrated alfalfa pellets	1.0	1.0
Salt	.07	.07
Bonemeal-salt mixture	.07	.07
Feed per cwt. gain, lbs.:		
Dehydrated grain sorghum pellets	873.6	
Grain sorghum silage		1924.0
Soybean oil meal	49.9	51.1
Dehydrated alfalfa pellets	49.9	51.1
Salt	3.4	3.8
Bonemeal-salt mixture	3.4	3.8
Feed cost per cwt. gain	$25.22	$13.09

Rolled vs. Finely Ground Pelleted Sorghum Grain in Cattle Rations. Project 567.

Progress Report

D. Richardon, E. F. Smith, B. A. Koch, F. W. Boren, and W. S. Tsien

This is a progress report of another test to further evaluate methods of sorghum grain preparation. Twenty of the heaviest steer calves purchased for experimental work were divided into two lots of 10 animals each. The daily ration is shown in Table 27. The only difference in the ration is that lot 3 received rolled sorghum grain and lot 4 finely ground pelleted sorghum grain. The gains and feed efficiency up to this time are essentially the same. The feed cost per 100 pounds gain is exactly the same. After completing the wintering phase, these animals will receive a fattening ration.

Table 27

Rolled sorghum grain vs. finely ground pelleted sorghum grain in wintering rations of steers.

December 3, 1959, to March 24, 1960—112 days.

Lot number	3	4
Number steers per lot	10	10
Av. initial wt., lbs.	560	562
Av. final wt., lbs.	762.5	768.5
Av. daily gain per animal, lbs.	1.81	1.84
Av. daily ration, lbs.:		
Atlas sorghum silage	28.5	27.5
Alfalfa hay	1.3	1.3
Soybean oil meal	1.0	1.0
Rolled sorghum grain	4.0	
Pelleted sorghum grain		4.0
Feed per cwt. gain, lbs.:		
Atlas sorghum silage	1578	1494
Alfalfa hay	73	72
Soybean oil meal	55	54
Rolled sorghum grain	221	
Pelleted sorghum grain		217
Feed cost per cwt. gain	$10.57	$10.57

Adapting Roughages Varying in Quality and Curing Processes to the Nutrition of Beef Cattle, 1959-60. Project 370.

Pelleted Alfalfa Hay and Dehydrated Pelleted Green Forage-type Sorghum in the Winter Ration of Heifer Calves

F. W. Boren, E. F. Smith, B. A. Koch, D. Richardson, and R. F. Cox

This is the second year of an experiment designed to compare the feeding value of alfalfa fed as long hay or coarsely-ground hay pellets, and forage-type sorghum fed as silage or dehydrated green forage sorghum pellets.

The hay and forage sorghum used were similar to that used in 1958-59 and described in Circular 371, page 41.

Fifty head of choice-quality heifer calves from the Jeff Ranch, Fort Davis, Texas, were used in this experiment. They were allotted, 10 head per lot, on the basis of live weight, and fed a winter ration as follows:

Lot 1. Five pounds alfalfa hay plus forage sorghum silage, free choice.

Lot 2. Five pounds alfalfa hay pellets plus forage sorghum silage, free choice.

Lot 3. Five pounds alfalfa hay plus dehydrated green forage sorghum pellets, free choice.

Lot 4. Five pounds alfalfa hay pellets plus dehydrated green forage sorghum pellets, free choice.

Lot 5. Five pounds dehydrated alfalfa pellets plus dehydrated green forage sorghum pellets, free choice.

Results and Observations

The results of this experiment are reported in Table 28. This table reveals the following:

1. Using lot 1, which received alfalfa hay and silage, as a control, the increase in average daily gain made by the heifers in lots 3, 4, and 5 was highly significant.

2. The percentage increase in average daily gain made by the heifers in lots 2, 3, 4, and 5 over lot 1 was 21, 32, 38, and 45, respectively.

3. Under the system of limiting alfalfa hay pellets to 5 pounds per head per day and feeding dehydrated pelleted green forage sorghum free choice, pelleted alfalfa hay affected the variability of gains between lots 24 percent, whereas the pelleted forage sorghum effect was 58 percent. Therefore, it was more advantageous to pellet the forage sorghum than the alfalfa hay under this feeding regime.

4. There was no significant difference between the gains made by the heifers in lots 4 and 5. This indicates that pelleted, sun-cured alfalfa hay and dehydrated alfalfa pellets will produce similar results under this type of feeding system.

5. There were no adverse effects of an all-pellet forage ration on heifers in lots 4 and 5.

6. The dry matter consumption was sharply increased when dehydrated pelleted green forage sorghum was fed.

7. There was no great difference in the dry matter required to produce 100 pounds of gain in lots 1, 4, and 5. Lots 2 and 3 required more dry matter to produce 100 pounds of gain than the other lots.

8. The average feed cost per cwt. gain increased as the dry matter consumption increased.

Table 28

The effect of pelleted alfalfa hay and dehydrated pelleted green forage-type sorghum[1] on the winter performance of weaning heifer calves.

Wintering—November 24, 1959, to March 15, 1960, incl.—112 days.

Lot number	1	2	3	4	5
Number heifers per lot	10	10	10	10	10
Av. initial wt. per heifer, lbs.	455	451	450	451	452
Av. final wt. per heifer, lbs.	592	592	603	612	618
Av. gain per heifer, lbs.	117	141	153	161	169
Av. daily gain per heifer, lbs.	1.04	1.26	1.37[2]	1.44[2]	1.51[2]
Percentage increase in av. daily gain		21	32	38	45
Av. daily ration per heifer, lbs.:					
Alfalfa hay	5.0		5.0		
Ground alfalfa hay pellets		5.0		5.0	
Sorghum silage[2]	21.8	26.8			
Dehydrated pelleted sorghum[3]			12.4	11.6	11.7
Dehydrated alfalfa pellets					5.0
Av. dry matter consumed per head per day	11.18	12.68	16.45	15.84	15.75
Percentage increase in dry matter consumption		1	47	43	42
Lbs. feed per cwt. gain:					
Alfalfa hay	479		366		
Ground alfalfa hay pellets		397		348	331
Sorghum silage	2085	2128			
Dehydrated pelleted sorghum					778
Dehydrated alfalfa pellets			904	808	
Av. dry matter required per cwt. gain	1074	1235	1204	1096	1051
Av. feed cost per cwt. gain[1]	$ 9.04	$10.88	$16.15	$14.97	$19.49

1. Feed prices may be found inside back cover.
2. Significantly ($p<.01$) greater than the gains made in lot 1.

Studies on Shipping Fever and Shipping Shrink in Cattle.

F. W. Boren, H. D. Anthony, D. C. Kelley, D. L. Nelson, E. F. Smith, and S. Wearden

This is a joint project between the Departments of Veterinary Medicine and Animal Husbandry financed in part by Smith, Kline, and French Laboratories, Philadelphia, designed to determine some basic facts related to shipping fever and shipping shrink in cattle and, in particular, weaned stocker calves.

Experimental Procedure

The calves used in this study were from Jeff Ranch, Fort Davis, Texas. They were gathered early October 21, 1959, weaned from the cows, loaded into trucks, and transported about 50 miles to loading pens in Alpine, Texas. They were group-weighed to determine a pay weight.

At this time, 50 head of heifer calves were randomly selected from the 175 heifers. The 50 heifers were then randomly assigned to two groups. Treatments for each group follow: (1) Control-calves injected intramuscularly with sterile saline; (2) calves injected with 25 mgs. per 100 pounds body weight of SKF 5354-A (Trifluomeprazine). The calves were individually identified with metal number tags. The following specimens were obtained in Alpine, Texas, from each calf: (1) Two nasal swabs; (2) body temperatures; (3) a blood sample. Citrated blood samples were examined at the hospital in Alpine to determine the leukocyte count and packed-cell volume. Blood was returned to Manhattan, Kan., for examinations.

The two groups of calves were then individually weighed, combined, loaded into one cattle car and shipped to Manhattan October 21. They were enroute 114 hours, being unloaded for hay and water at Gainesville, Texas, and Kansas City, Kan., before arriving in Manhattan (October 26), where they were group-weighed, hauled by truck to the Beef Cattle Experimental unit at Kansas State University, individually weighed, body temperatures taken, blood samples collected, and two nasal swabs obtained from each animal.

The heifers then were separated into two groups, irrespective of treatment, and placed in two lots. Subsequently, seven additional examinations, including temperatures, two nasal swabs, blood samples, and body weights, were made for each animal. The seven examinations were on days 1, 3, 5, 8, 11, 15 and 25 after the calves arrived in Manhattan. All calves were observed daily for symptoms of shipping fever.

The nasal swabs that were collected from the experimental calves were plated on tryptone blood agar plates. Special emphasis was placed on the isolation of Pasteurella organisms. Fermentation reactions were used to identify both Pasteurella multocodia and Pasteurella hemolytica bacteria.

Packed-cell volumes were determined for both the erythrocyte evaluations and the occurrence of hemoconcentration. White blood cells were enumerated. Blood films were prepared for differential leukocyte counts.

Serum samples were collected, identified and stored. These samples will be used for further comparative studies with serum samples that will be collected from a calf studied under identical environmental conditions.

Results and Observations

1. Shipping fever did not occur in any of the calves during the experimental period.
2. Pasteurella organisms were isolated from 33 of the 50 calves studied.
3. Number of leukocytes decreased in both the control and tranquilized groups of cattle between the 8th and 16th days.
4. The packed-cell volume of the control group remained significantly higher than the packed-cell volume of the tranquilized group during the test period.
5. Tranquilizer used in this study did not significantly decrease shrink. Average shrink of the treated group was more than the control group (9% vs. 8%), not statistically significant. The average shrink of the 299 head of calves, which were mates to the test group, was 9.32%. This was very close to the shrink encountered in the group of calves on the experiment. Physical treatment the calves on experiment were subjected to in the collection of data apparently did not affect total shrink.

6. It required 7 to 9 days for the control group to regain original average weight, whereas, the tranquilized group required 12 to 15 days to return to original weight.

The Effects of Shade and Hormone Implant on Fattening Yearling Heifers, 1959; and a Three-year Summary, 1957-1958-1959.

F. W. Boren, E. F. Smith, B. A. Koch, D. Richardson, and S. Wearden

This is the third year of an experiment designed to study the value of shade for beef cattle under Kansas conditions. The experiment was designed also to study the effects of Synovex heifer implant (20 mgs. estradiol benzoate and 100 mgs. of testosterone) on the performance of heifers in drylot with and without shade. One lot of heifers having no shade was implanted with Rapigain Implant Paste (20 mgs. estradiol, 60 mgs. testosterone, and 60 mgs. progesterone). Synovex and Rapigain implants were furnished by Squibb and Sons. Two previous tests are reported in Circulars 358 and 371.

Experimental Procedure

Fifty head of Hereford heifers averaging 607 pounds per head were used in 1959. They were placed in five lots, 10 head per lot, on the basis of live weight and previous treatment.

The heifers were on test from May 14, 1959, to October 1, 1959 (140 days). At the beginning of the experiment the heifers were consuming 8 pounds of sorghum grain, 1 pound of soybean meal, and 5 pounds of alfalfa per head daily. They were rapidly brought to a daily ration composed of all the sorghum grain they would consume, 1 pound of soybean meal, and 5 pounds of alfalfa hay. At the termination of the test, the heifers were sold on the central market at St. Joseph, Mo.

The shade structures used were the same as described in Circular 371, page 36.

One lot of heifers having access to shade, and one lot of heifers having no shade, were implanted at the beginning of the feeding trial with one Synovex hormone implant as described above. One lot having no shade was implanted at the beginning of the experiment with Rapigain Paste implant.

Results and Observations

Table 29 shows the results of this experiment.

1. Shade improved the average daily gain of nonimplanted heifers 0.23 pound more per head daily than those without shade; however, shade improved the average daily gain of implanted heifers only 0.04 pound per head daily. This is the reverse of 1958 when greatest response to shade (0.12 pound per day) was with the implanted heifers.
2. Synovex heifer implant increased average daily gain of the heifers without shade 0.15 pound per head daily; however, there was no increase in average daily gain of implanted heifers with shade.
3. The combined effects of shade and Synovex heifer implant resulted in a 0.19-pound increase in average daily gain.
4. Heifers with shade and not implanted were the most efficient in feed utilization. They required about 100 pounds less total feed per cwt. gain than the nonimplanted heifers without shade.
5. Synovex heifer implant improved feed efficiency in the no-shade lot, but the reverse occurred in the shaded, implanted lot, the shaded nonimplanted heifers requiring less feed per cwt. gain.
6. Shade did not increase the feed efficiency of implanted heifers.
7. The feed cost per cwt. gain followed the same trend as the feed required per cwt. gain. The shaded, nonimplanted heifers made least cost per cwt. gain. Shade and implant heifers produced 100 pounds of gain for about $1 per cwt. less than the nonimplanted heifers without shade.
8. The selling price per cwt. was the same for all lots.
9. The heifers in lot 3 had an average carcass grade of low good; whereas, average carcass grade of the other lots was average good. The increase in carcass grade of lot 4 over 3 indicates that shade compensated for the decrease in grade due to the implant.

10. In lots 3, 4, and 5 the average square inches of ribeye was greater, apparently because these heifers were implanted and also were heavier at market time.
11. There was no difference in average fat thickness at the 12th rib among various lots.

Three-year Summary, 1957-1959

Table 30 presents a three-year summary of the effects of shade and hormone implant on fattening yearling heifers. In each of the three years the test was conducted 140 days during June, July, August, September, and October.

Results and Discussion

1. Shade, irrespective of implant, produced an increase in average daily gain that was significant ($p<0.05$).
2. The increased total gain per head due to shade was 17.4 pounds.
3. Implant, irrespective of shade, produced a significant ($p<0.05$) increase in average daily gain. This increased average daily gain resulted in the implanted heifers being 25.5 pounds heavier at market time.
4. Both shade and implant were responsible for more efficiency of production, requiring less feed per cwt. gain.
5. Carcass grades of implanted heifers were significantly lower ($p<0.05$) than nonimplanted heifers; however, not enough to cause a price difference, since the carcass grade difference was between average and high good (within grade) and not between high good and low choice (between grade).
6. Shade had no influence on carcass grade.
7. Implant and/or shade had no influence on the average fat thickness at the 12th rib.
8. Shade did not significantly affect size of ribeye; however, implant heifers had a highly significant ($p<0.01$) greater area of ribeye muscle at the 12th rib.
9. If cattle of the grade produced in this study sell for $25 per cwt., the shade would result in a $4.35 per head increase in returns over nonshaded cattle. Using this same liveweight price, $25 per cwt., the implant would result in a $6.37 per head increase in returns over nonimplanted cattle. The combined increase in returns due to shade and implant would be $10.72 per head.
10. The between-year difference in average daily gains of the shaded and/or implanted heifers was highly significant. It is difficult to explain why there was a year-to-year difference in the implanted cattle. The difference in average daily gain between years due to shade was apparently due to the great difference in the severity of the summer heat during the test period. If heat is severe, there could be a marked advantage in providing shade for feedlot cattle; however, if the summer is mild, the advantage of shade would be slight.

Table 29

The effect of shade and hormone implant[1] on fattening yearling heifers. May 14, 1959, to October 1, 1959—140 days.

Lot number	1	2	3	4	5
Number heifers per lot	10	10	10	10	10
Management	No shade	Shade	No shade implant[1]	Shade implant[1]	No shade implant[2]
Av. initial wt. per heifer, lbs.	606	608	605	607	608
Av. final wt. per heifer, lbs.	863	898	883	891	867
Av. gain per heifer, lbs.	257	290	278	284	259

1. Synovex heifer implant—20 mgs. estradiol benzoate and 100 mgs. testosterone. Squibb & Sons.
2. Rapigain Implant Paste—20 mgs. estradiol, 60 mgs. testosterone, and 60 mgs. progesterone. Squibb & Sons.

Table 29 (Continued)

Av. daily gain per heifer, lbs.	1.84	2.07	1.99	2.03	1.85
Av. daily ration per heifer, lbs.:					
Ground sorghum grain	13.9	14.3	10.4	14.6	14.0
Soybean oil meal	1.0	1.0	1.0	1.0	1.0
Alfalfa hay	5.0	5.0	5.0	5.0	5.0
Lbs. feed per cwt. gain:					
Ground sorghum grain	758	689	705	719	754
Soybean oil meal	54	48	50	49	54
Alfalfa hay	272	241	252	246	270
Total feed per cwt. gain	1084	978	1007	1014	1078
Feed cost per cwt. gain[3]	$17.85	$16.13	$16.57	$16.75	$17.76
Selling price per cwt. at market	$25.25	$25.25	$25.25	$25.25	$25.25
Carcass data					
Carcass grades, USDA:					
High choice	1	1			
Av. choice	1	1	1	1	1
Low choice	1	1	1	1	
High good	1	1	2	1	
Av. good	4	3			7
Low good	3	3	6	7	2
Av. carcass grade[4]	17.7	17.4	16.2	17.1	17.1

3. Prices of feed per cwt. are listed on inside back cover.

4. Av. choice, 20; low choice, 19; high good, 18; av. good, 17; low good, 16.

Table 30

The effects of shade and hormone[1] implant on fattening yearling heifers; three-year summary, 1957-1959—140-day fattening period.

Lot number	1	2	3	4
Number heifers per lot	25	25	25	25
Management	No shade	Shade	No shade implant	Shade implant
Total gain per heifer, lbs.	260.2	281.4	289.0	303.6
Av. daily gain per heifer, lbs.	1.86	2.01	2.06	2.17
Lbs. feed per cwt. gain:				
Ground sorghum grain	734	715	669	667
Soybean oil meal	53	49	47	45
Alfalfa hay	270	251	242	233
Total feed required per cwt. gain	1057	1015	958	945
Carcass data:				
Av. USDA carcass grade[2]	17.52	18.08	17.48	17.08
Av. fat thickness at 12th rib	0.57	0.60	0.62	0.62
Av. size of ribeye muscle, sq. in.	10.01	10.24	10.62	10.72

1. Synovex implant—20 mgs. estradiol benzoate, 100 mgs. testosterone. Squibb & Sons.

2. Low choice, 19; high good, 18; av. good, 17; low good, 16.

Tranquilizers in Fattening Rations of Individually-fed Steers (with and without Added Diethylstilbestrol). Project 597.*

M. M. McCartor, B. A. Koch, D. Richardson, and E. F. Smith

A preliminary report of this tranquilizer study and a description of the cattle used appeared on page 34 of Kansas Circular 371, May 2, 1959. That report was based on the first 49 days of the study.

Experimental Procedure

Twenty-four steer calves weighing approximately 500 pounds each were randomly allotted into six treatment groups of four each. Animals were individually fed twice daily. The daily ration consisted of cracked corn, soybean oil meal, and chopped alfalfa hay. During the part of the day when they were not eating, the calves were penned in two groups of 12 each. One month was allowed to train the calves and accustom them to being tied twice daily for individual feeding. During the study each steer spent two different periods of time in a digestion stall for urine and fecal sample collections.

Animals were placed on their respective treatments February 3, 1959. The various additives were carried in the soybean oil meal. Treatment groups were as follows:

1. Control
2. 10 mgs. diethylstilbestrol[1]
3. 10 mgs. diethylstilbestrol plus trifluomeprazine[2]
4. 10 mgs. diethylstilbestrol plus Tran-Q[3]
5. 5.0 mgs. trifluomeprazine
6. 2.5 mgs. Tran-Q

The first digestion trial was started April 1 when six calves, one from each treatment group, were placed in digestion stalls. Over an eight-week period each calf spent two weeks in a digestion stall. After a one-week preliminary period to allow the calves to become accustomed to stalls, a complete collection of urine and feces was made over a seven-day period. A second collection period similar to the first was started September 22, 1959.

Representative samples of all feed, feces, and urine collections are currently being analyzed in the nutrition laboratory of the Department of Animal Husbandry.

Observations

Since confinement to the digestion stalls had a varied effect on the steers, the gain and feed data presented in Tables 31 and 32 cover only the 94 days between collection periods.

Data on only two steers are presented for group six receiving 2.5 mgs. of Tran-Q daily in addition to the basic ration. One of the steers was disposed of because of a broken leg, data on the second steer was eliminated because the animal suffered from severe arthritis, and performed very poorly.

Steers adjusted rather easily to the twice-per-day individual feeding regime.

Differences between treatment groups were small in all cases.

Steers receiving diethylstilbestrol plus Tran-Q showed the highest average daily gain and also gained most efficiently.

None of the additives had any significant effect on carcass grade.

Results of the digestion phase of the study are not yet completed.

*Partially supported by a grant from Chas. Pfizer & Co., Terre Haute, Ind.

1. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.

2. Trifluomeprazine furnished by Smith, Kline, & French Labs., Philadelphia, Pa.

3. Tran-Q (hydroxyzine) furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.

Table 31

Tranquilizers in the fattening ration of individually-fed steers (with and without added diethylstilbestrol). Project 597.[1]

Treatment	Control	Stil.	Stil. + T.F.M.	Stil. + T.Q.	T.F.M.	T.Q.[2]
Number steers per lot	4	4	4	4	4	2
Av. initial wt. per steer, lbs.	712.5	738.7	782.5	715.0	745.0	717.5
Av. final wt. per steer, lbs.	925.0	942.5	998.7	936.2	953.7	905.0
Av. total gain per steer, lbs.	212.5	203.8	216.2	221.2	208.7	187.5
Av. daily gain per steer, lbs.	2.26	2.16	2.30	2.36	2.22	1.99
Daily ration per steer, lbs.:						
Cracked corn	11.87	12.04	13.01	11.90	12.19	12.74
Soybean oil meal	.99	.95	1.01	1.02	.96	.95
Alfalfa hay (chopped)	2.81	2.85	3.35	3.21	3.34	3.42
Tran-Q, mgs.[3]				2.5		2.5
T.F.M.			5.0		5.0	
Stilbestrol, mgs.		10.0	10.0	10.0		
Feed per cwt. gain, lbs.:						
Cracked corn	541.8	573.2	583.6	521.8	566.7	659.2
Soybean oil meal	45.4	45.4	45.3	44.9	44.7	49.3
Chopped alfalfa hay	128.3	135.7	150.5	140.7	155.0	177.3
Feed cost per cwt. gain[3]	$15.04	$15.70	$16.14	$14.66	$15.78	$15.22
Carcass grades, USDA:						
High choice	1	1	1	1		
Av. choice	1		1		1	
Low choice		2		1	3	
High good	2		1	1		1
Av. good			1	1		1
Low good		1				
Av. USDA grade[4]	13.2	12.8	13.0	12.8	13.2	11.5

1. The above table presents only data from the 84-day period between collection periods.

2. Two steers from this group were removed: one because of a broken leg, the other because of a severe case of arthritis which adversely affected his performance.

3. Not including tranquilizer cost or mixing cost.

4. Average grade determined as follows: High choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10.

Table 32

Steers grouped according to over-all treatment (diethylstilbestrol vs. control) and (tranquilizer vs. control).

Treatment	Stilbestrol	No stilbestrol	T.F.M.	Tran-Q	No tranquilizer
Number steers per treatment	12	10	8	6	8
Av. initial wt., lbs.	715.4	724.5	763.7	716.2	725.6
Av. final wt., lbs.	959.1	927.9	976.2	920.6	933.7
Av. total gain, lbs.	243.7	203.4	212.5	204.4	208.1
Av. daily gain, lbs.	2.27	2.15	2.26	2.17	2.21
Carcass grades, USDA:					
High choice	3	1	1	1	2
Av. choice	1	2	2		1
Low choice	1	2	2		2
High good	3	3	2	1	2
Av. good	2	1	1	2	2
Low good	1				1
Av. USDA grade[1]	12.8	12.9	13.1	12.3	13.0

1. Average grade determined as follows: High choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10.

Improvement of Beef Cattle Through Breeding Methods. Project 286.

W. H. Smith and J. D. Wheat

The purebred Shorthorn cattle breeding project was continued during 1959 and thus far in 1960 according to the plans and breeding programs initiated in 1949. The only deviation encountered to date in the project occurred during 1957 when a bull representing the Wernacre Premier line was not available for breeding use in the experimental herd. All females were bred to Mercury Line bulls that year and a number of line-cross calves were produced in 1958. Wernacre Premier line bulls have been used during 1958 and 1959 so that line may be continued according to project plans. The Wernacre Premier line has reached the fourth generation of inbreeding, while the Mercury line is in the third generation of inbreeding.

This experiment was initiated to study the inheritance of beef cattle production traits and to evaluate the effects of inbreeding on the same. To date, no abnormalities, which could be attributed to inbreeding, have occurred in either of the inbred lines. Preliminary analyses of the data obtained on the study indicate that inbreeding has lowered the weaning weights of the calves; however, this breeding plan has had no apparent effects on rate of gain or efficiency of feed utilization on the calves so produced.

Extensive line-crossing has not been attempted to date because of the limited number of breeding animals in the project and the relatively low levels of inbreeding which still exist in the breeding herd. More extensive line-crossing will be initiated at some time in the future to evaluate the feasibility of using inbred lines of beef cattle for the breeding improvement of production traits.

The weight of each cow and the weight of each calf are taken at the time of calving. Summer pasture breeding is practiced and the calves are born in the spring of each year. The calves are not creep fed during the suckling period. Calves are weaned, weighed, and scored for type when approximately 6 months old. After a short preliminary adjustment period, they are placed on individual feeding trials or record-of-performance tests for a 182-day period. Weight gain and feed consumption records are maintained on each calf.

The full-feed ration for the bulls consists of 75% cracked corn and 25% chopped alfalfa hay; that for the heifers, 55% cracked corn and 45% chopped alfalfa hay.

Production data for the 1958 calves are summarized in Table 33.

Thus far in the study, the Wernacre Premier calves have been more highly inbred than the Mercury calves. The Wernacre Premier calves have made slightly higher average gains, but have required more feed per 100 pounds of live body weight than the Mercury calves.

At present, all breeding animals in the experimental herd have been produced in the herd and have been performance tested on an individual feeding basis.

The 1959 calves have not completed their feeding tests, so data for them are not summarized in this report.

Table 33
Summary of the 1958 Shorthorn calves of the Mercury line and line crosses.

Tattoo number	Coefficient of inbreeding[1]	Birth weight	Weaning weight	Weaning score	Days fed	Initial weight	Final weight	Total gain	Average daily gain	Final score	Pounds corn per cwt. gain	Pounds alfalfa per cwt. gain
						Mercury Line—Bulls						
821	21.60	64	305	2−	182	322	725	403	2.21	2+	355	194
823	16.80	50	272	3	182	296	652	356	1.96	2−	389	208
825	18.75	68	266	3+	182	287	675	287	2.13	2	398	195
827	10.16	72	297	3	182	315	712	397	2.18	2+	375	188
829	16.80	60	334	2	182	357	710	353	1.94	2	439	247
843	10.94	57	286	3+	182	303	702	399	2.19	2	385	207
847	14.46	56	317	3+	182	340	807	467	2.57	2−	308	186
849	6.44	70	345	2−	182	345	690	326	1.79	2+	483	248
Average	14.49	62	303	2−	182	321	709	374	2.12	2	392	209
						Heifers						
803	21.88	54	340	2−	182	385	681	296	1.63	2+	399	385
805	17.58	52	298	3	182	326	643	317	1.74	2	352	328
813	19.34	53	285	2−	182	300	610	310	1.70	1−	350	329
817	19.14	51	281	2−	182	305	522	217	1.19	2+	442	410
819	8.98	60	298	3+	182	313	580	267	1.47	2	384	360
835	13.48	68	318	3+	182	325	650	325	1.79	2	420	382
837	13.48	65	325	2−	182	330	680	350	1.92	1−	466	423
841	33.59	49	285	2−	182	292	650	358	1.97	2+	373	341
857	15.72	75	280	2−	182	290	576	286	1.57	2−	425	385
Average	18.13	59	300	2−	182	318	621	303	1.66	2+	401	371
						Line Crosses—Bulls						
811	0	70	470	2+	182	506	935	429	2.36	1	500	213
833	0	52	348	3+	182	372	830	458	2.52	2+	441	226
839	0	50	365	3+	182	385	850	465	2.55	2	391	205
845	0	60	327	3	182	332	840	518	2.85	2−	425	215
859	0	75	312	3	182	340	773	433	2.38	2	389	206
815	0	57	356	3+	182	385	805	420	2.31	2	444	231
Average	0	61	363	3+	182	387	839	454	2.50	2	432	216
						Heifers						
807	0	68	412	2	182	440	755	315	1.73	2+	381	362
851	0	55	350	3	182	355	715	360	1.98	2−	340	356
853	0	63	360	2−	182	351	665	314	1.73	2+	365	344
861	0	57	320	3+	182	339	716	377	2.07	2	269	255
Average	0	61	361	2−	182	371	713	342	1.88	2+	339	329

1. The coefficient of inbreeding means the percentage of inbreeding. Individuals from brother-sister matings are 25 percent inbred, and those from half-sib matings are 12.5 percent inbred. The line-cross calves are not inbred. No Wernacre Premier calves were produced during 1958.

The Value of Diethylstilbestrol Implants[1] for Yearling Steers on Bluestem Pasture, 1959; and a Three-year Summary, 1956, 1957, and 1959. Project 253-5.

B. D. Carmack, E. F. Smith, B. A. Koch, and F. W. Boren

This is the third in a series of trials to determine the value of diethylstilbestrol implants for yearling steers grazed on summer bluestem pasture. The previous trials are reported in Kansas Circulars 349 and 358. Earlier trials included tests with the 12-mg., 24-mg., and 36-mg. per head level. It was found that the 24-mg. level gave a greater gain response than the 12-mg. and that 36-mg. gave no greater response than the 24-mg. level. The current test used only the 24-mg. level and only the 24-mg. level is included in the three-year summary reported in Table 35.

Experimental Procedure

One hundred thirty-five yearling Hereford steers grading good to choice being used in summer grazing trials were used in the test. They were randomly allotted according to weight to seven different pasture treatments, and the stilbestrol implant study was superimposed on each pasture treatment. Half of the steers in each pasture were randomly selected as controls, taking weight into consideration, and the remainder were implanted with 24 mgs. of diethylstilbestrol at the start of the grazing season. Each steer was assigned a USDA feeder grade by a committee of animal husbandmen at the start and close of the trial.

Observations

The results of the trial are reported in Table 34.

The 24-mg. stilbestrol implant given each steer in the treatment group increased steer gains on each pasture compared with the controls. The over-all average increase in daily gain was 0.19 pound per head daily. The feeder grade did not appear to be affected by implanting.

Summary of Three Trials

The results for three years are reported in Table 35.

Gains were increased in each pasture each year of the study by implanting steers with 24 mgs. of diethylstilbestrol. The total gain increase was 0.22 pound per head daily.

1. Diethylstilbestrol ear implants (Stimplants) were furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.

Table 34

Effect of stilbestrol implants on yearling steers pastured on bluestem pasture. May 5, 1959, to November 2, 1959—181 days.

Pasture number	Treatment	Number of steers	Av. daily gain	Av. USDA feeder grade[1] 5-5-59	Av. USDA feeder grade[1] 11-3-59	Pasture treatment
1	Control	8	1.26	12.3	11.7	Normally stocked
	24-mg. implant	9	1.51	11.6	11.6	
2	Control	10	1.21	11.3	12.0	Over-stocked
	24-mg. implant	11	1.48	12.0	11.9	
3	Control	5	1.30	11.6	12.1	Under-stocked
	24-mg. implant	6	1.57	11.7	11.6	
4	Control	26	1.07	11.4	11.9	Deferred and rotated
	24-mg. implant	24	1.18	11.9	11.8	
9	Control	6	1.34	12.5	12.6	Early-spring-burned
	24-mg. implant	6	1.46	11.8	11.6	
10	Control	6	1.39	12.0	12.2	Mid-spring-burned
	24-mg. implant	6	1.65	12.0	11.9	
11	Control	6	1.52	11.6	12.5	Late-spring-burned
	24-mg. implant	6	1.75	12.6	12.6	
Total and average:						
	Control	67	1.23	11.7	11.9	
	24-mg. implant	68	1.42	11.9	11.8	

1. Each steer was scored by a committee of animal husbandmen and assigned a grade. The numerical value of 11 stands for high good, 12 for low choice.

Table 35

Three-year summary—effect of stilbestrol implants on steers on bluestem pasture, 1956-1957-1959.

May to October—165 days.

Pasture number	Treatment	Number of steers	Av. daily gain	Pasture treatment
1	Control	26	1.24	Normally stocked
	24-mg. implant	18	1.47	
2	Control	34	1.24	Over-stocked
	24-mg. implant	22	1.49	
3	Control	18	1.27	Under-stocked
	24-mg. implant	12	1.47	
4	Control	81	1.08	Deferred and rotated
	24-mg. implant	51	1.22	
9	Control	18	1.40	Early-spring-burned
	24-mg. implant	14	1.50	
10	Control	19	1.40	Mid-spring-burned
	24-mg. implant	13	1.73	
11	Control	19	1.41	Late-spring-burned
	24-mg. implant	13	1.72	
Total and average:				
	Control	215	1.29	
	24-mg. implant	143	1.51	

The Value of Supplementary Trace Minerals[1] in a Fattening Ration. Project 253-2.

B. D. Carmack, E. F. Smith, B. A. Koch, and F. W. Boren

This is the sixth experimental trial conducted to determine the value of added trace minerals in a cattle fattening ration. The previous experiments were reported in Kansas Circulars 279, 308, 335, 358, and 371. No response was obtained in these experiments when trace minerals were added to high roughage rations or sorghum grain fattening rations. The addition of trace minerals to a corn-fattening ration has shown favorable results. Ground limestone has been in all fattening trials to furnish adequate calcium.

Experimental Procedure

Forty head of good-to-choice Hereford yearling heifers were divided into four lots, 10 in each lot, on the basis of weight and previous treatment. The heifers were purchased near Fort Davis, Texas, as calves the fall of 1958. They were wintered and summer grazed on bluestem pastures near Manhattan before the experiment.

Lot 13 was fed a control ration of corn, protein supplement, prairie hay, and ground limestone. Lot 14 received the same ration with added trace minerals. Lot 15 received a control ration of sorghum grain, protein supplement, prairie hay, and ground limestone. Lot 16 received the same ration with added trace minerals.

The grain was self-fed and the prairie hay was fed daily in quantities readily eaten. The daily allowance of ground limestone was mixed with the soybean meal and fed once daily.

The trace minerals were supplied in a premix added to the soybean meal to furnish these quantities in milligrams per head daily: cobalt, 1.25; copper, 3.65; iodine, 1.97; iron, 46.13; manganese, 56.3; and zinc, 3.42.

Observations

The addition of trace minerals to the corn ration of the heifers in lot 14 improved feed efficiency and increased the daily gain an average of 0.56 pound per head daily over the heifers in lot 13. The addition of trace minerals to the sorghum grain ration of the heifers in lot 16 increased the daily gain an average of 0.33 pound per head daily, with a slight increase in feed efficiency over lot 15. The carcasses in general were about the same; however, carcasses from lot 14 and lot 16 (trace mineral lots) graded slightly higher.

This was the first trial in which a response has been obtained by adding trace minerals to a sorghum grain fattening ration.

1. Supplied by Calcium Carbonate Company, Chicago, Ill.

Table 36

The value of supplementary trace minerals in a fattening ration.

July 25, 1959, to November 6, 1959—104 days.

Lot number	13	14	15	16
Number heifers per lot	10	10	9[1]	9[2]
Treatment	Corn	Corn plus trace mineral	Sorghum grain	Sorghum grain plus trace mineral
Av. initial wt. per heifer, lbs.	608	599	604	605
Av. final wt. per heifer, lbs.	850	900	864	900
Av. gain per heifer, lbs.	242	301	260	295
Av. daily gain per heifer, lbs.	2.33	2.89[3]	2.50	2.83[3]
Av. daily ration per heifer, lbs.:				
Ground corn, self-fed	15.3	15.2		
Ground sorghum grain, self-fed			17.3	18.2
Soybean oil meal	1.5	1.5	1.5	1.5
Prairie hay	4.5	4.5	4.9	4.7
Ground limestone	0.1	0.1	0.1	0.1
Salt, free choice				
Trace minerals	No	Yes	No	Yes
Total feed per cwt. gain, lbs.:				
Corn	655	526		
Sorghum grain			691	643
Soybean oil meal	65	52	60	48
Prairie hay	193	155	196	166
Feed cost per cwt. gain[4]	$18.45	$14.79	$18.05	$16.58
Total feed cost	$44.64	$44.51	$46.93	$48.92
Selling price per cwt. gain[5]	$22.22	$22.35	$22.53	$22.48
Dressing percentage	57.2	57.3	58.0	57.3
Carcass grades, USDA				
Low choice	0	0	0	2
High good	2	6	3	1
Av. good	5	3	2	4
Low good	2	1	3	2
High standard	1	0	1	0
Av. degree marbling score[6]	7.8	7.3	7.6	7.3
Av. size ribeye, sq. in.	9.76	10.39	10.16	9.92

1. One heifer was removed due to founder.

2. One heifer removed due to unthriftiness.

3. Gains significantly greater at the .05 level for lot 14 over 13; and lot 16 over 15.

4. See inside back cover for feed prices.

5. Selling price was computed on the basis of carcass grade, weight, and carcass price: Choice, $40 per cwt.; good, $39; standard, $37.50.

6. Scores for degree of marbling: small amount, 7; slight amount, 8.

Sheep

Concentrate-Roughage Ratios in Pelleted Rations for Fattening Lambs. Three Mgs. Stilbestrol Implants[1] and/or Cobalt Bullets[2] for Lambs Fed Pelleted Rations. Project 236.

C. S. Menzies, D. Richardson, and R. F. Cox

Data presented in Circulars 358 and 371 indicate that lambs make faster and more efficient gains on pelleted rations than on similar nonpelleted rations. Those data also indicate that efficient pelleted rations for lambs should contain larger proportions of roughage than nonpelleted rations do. This year's test is designed to further study the concentrate-roughage ratios in pelleted rations for fattening lambs.

Experimental Procedure

One hundred fifty white-faced New Mexico wether lambs were used. Lambs were shorn and drenched with phenothiazine before starting on test. Two weeks after the lambs arrived from the range an outbreak of coccidiosis occurred. Approximately half of the lambs were treated with sulfa-drugs. November 30, about five weeks after lambs arrived from range, they were weighed, divided into six lots of 22 lambs each, and self-fed the following pelleted rations:

Lot 1. 10% sorghum grain and 90% alfalfa hay.
Lot 2. 20% sorghum grain and 80% alfalfa hay.
Lot 3. 30% sorghum grain and 70% alfalfa hay.
Lot 4. 40% sorghum grain and 60% alfalfa hay.
Lot 5. 50% sorghum grain and 50% alfalfa hay.
Lot 6. 60% sorghum grain and 40% alfalfa hay.

Ten lambs in each lot were implanted with 3 mgs. stilbestrol. Twelve lambs were not implanted. Five lambs that were implanted and six that were not implanted were given a 5-gm. cobalt bullet. The cobalt bullet was released in the esophagus with a balling gun. The cobalt bullet supposedly remained in the rumen throughout the test period.

Average-quality field-cured alfalfa hay was used. Sorghum grain was purchased in bulk. Hay was ground through a ½-inch screen and the grain was coarsely ground. Both 3/16- and 3/8-inch pellets were fed to all lots. Rations were pelleted at the University mill.

Feed prices and processing charges used in determining feed cost per cwt. gain were: ground sorghum grain, $1.65 per cwt.; baled alfalfa hay, $16 per ton; grinding hay, $5 per ton; mixing, pelleting, and sacks cost $6 per ton. With these prices and charges, pellets cost as follows: 10% grain and 90% alfalfa, $28.20 per ton; 20% grain and 80% alfalfa, $29.40 per ton; 30% grain and 70% alfalfa, $30.60 per ton; 40% grain and 60% alfalfa, $31.80 per ton; 50% grain and 50% alfalfa, $33 per ton; and 60% grain and 40% alfalfa, $34.20 per ton.

Results and Discussion

Results of the study are shown in Table 37. Results of the stilbestrol implant and cobalt study are summarized in Table 38.

There was little difference in rate of gain of lambs fed pellets containing from 10 to 40% grain. However, all of them gained faster than those fed pellets containing 50 or 60% grain. Lambs fed the less concentrated pellets ate more feed per day.

More efficient gains were made by lambs fed the more concentrated pellets in lots 5 and 6 and the least efficient gains by lambs in lot 1 fed the 10% grain-90% hay pellet.

For some reason there was considerable variation in shrink to market. Lambs fed high roughage pellets (lots 1, 2, and 3) shrank considerably

1. Three mgs. stilbestrol implants supplied by Chas. Pfizer & Co., Inc., Terre Haute, Ind.

2. Cobalt bullets supplied by Nicholas International Limited, Toronto, Ontario, Canada.

more than those in lots 4, 5, and 6. Lambs in lot 3 produced highest yielding carcasses. There was about one third USDA carcass grade variation between lots.

Lambs fed high-roughage pellets produced cheaper gains. Variations in the price of grains or hay will tend to increase or decrease the difference in cost per pound of gain between the different concentrate-roughage ratios.

Three mgs. stilbestrol implants increased gains in all lots, an average of about 0.10 pound per lamb per day. Stilbestrol implants did not lower carcass grades in this test. Lambs not implanted yielded about 1% more.

Cobalt bullets did not affect gain, yield, or carcass grade.

Table 37

Concentrate-roughage ratios in pelleted rations for self-feeding fattening lambs.
November 30, 1959, to February 9, 1960—71 days.

Lot number	1	2	3	4	5	6
	RATION[1]					
Item	10% sorghum grain, 90% alfalfa hay	20% sorghum grain, 80% alfalfa hay	30% sorghum grain, 70% alfalfa hay	40% sorghum grain, 60% alfalfa hay	50% sorghum grain, 50% alfalfa hay	60% sorghum grain, 40% alfalfa hay
Number lambs per lot	22	22	22	22	22	22
Initial wt. per lamb, lbs.	68	68.2	67.9	68.8	67.1	69.6
Final wt. per lamb, lbs.	107.9	109.2	107.7	110.1	104.5	105.5
Total gain per lamb, lbs.	39.9	41.0	39.8	41.3	37.5	35.8
Av. daily gain per lamb, lbs.:						
(22 lambs)	.562	.577	.561	.582	.528	.504
No stilbestrol (12 lambs)	.538	.543	.532	.569	.434	.459
3-mg. stilbestrol implant (10 lambs)	.60	.618	.596	.597	.639	.559
No cobalt (11 lambs)	.583	.622	.535	.589	.519	.519
5-gm. cobalt bullet (11 lambs)	.542	.533	.586	.575	.536	.490
Pounds feed per lamb daily	4.90	4.85	4.51	4.54	4.01	3.86
Pounds feed per cwt. gain	871.4	839.7	804.1	780.7	761.0	764.2
Feed cost per cwt. gain[2]	$12.29	$12.34	$12.30	$12.41	$12.56	$13.07
Av. percentage shrink[3]	10.5	9.7	9.9	5.3	3.7	4.7
Av. USDA carcass grade[4]	8.7	8.7	9.1	9.5	8.7	9.6
Av. percentage yield[5]	52.0	51.5	53.4	51.9	51.2	51.7

1. Eleven of the 22 lambs in each lot were given a 5-gm. cobalt bullet. Five of these lambs and five not given cobalt in each lot received 3 mgs. stilbestrol implants.
2. Does not include cost of stilbestrol or cobalt.
3. Based on final weights, Manhattan, February 9, and lot market weights, St. Joseph, Mo., February 11.
4. Unrevised USDA carcass grade based on prime, 14; choice, 11; good, 8; utility, 5; and cull, 2.
5. Based on lot market weights, St. Joseph, Mo., February 11, and lot hot-dressed carcass weights, Swift & Company plant, St. Joseph, Mo., February 11.

Table 38

Three milligram stilbestrol implants and five gram cobalt bullets for fattening lambs fed pelleted rations.[1]

Treatment	No stilbestrol	3-mg. stilbestrol implant	No cobalt	5-gm. cobalt bullet[2]
Number lambs	72	60	66	66
Days on test	71	71	71	71
Initial wt. per lamb, lbs.	68.6	67.8	68.7	67.9
Final wt. per lamb, lbs.	105.0	110.5	108.6	106.5
Total gain per lamb, lbs.	36.4	42.7	39.9	38.6
Av. daily gain per lamb, lbs.	.513	.601	.562	.544
Percentage yield[3]	48.6	47.7	48.3	48.0
Av. USDA carcass grade[4]	9.04	9.05	9.09	9.0

1. Eleven of the 22 lambs in each of the six lots listed in Table 37 were given a 5-gm. cobalt bullet; five of these and five not given cobalt in each lot received 3-mg. stilbestrol implants.
2. Based on final lamb weights at Manhattan, February 9, and hot-dressed carcass weights at St. Joseph, Mo., February 11.
3. Unrevised USDA carcass grade based on prime, 14; choice, 11; good, 8; utility, 5; and cull, 2.
4. Five-gm. bullet contains 90% cobalt oxide.

Heritabilities, Genetic, and Phenotypic Correlations between Carcass and Live Animal Traits in Sheep. Project 347.

Carl Menzies, Myron Hillman, John D. Wheat, D. L. Mackintosh, and R. A. Merkel

This study was initiated in the spring of 1959 to determine relationships between various carcass measurements and live animal traits, to estimate heritability of these traits, and to determine how findings may be applied to the selection and breeding of the meat-type lamb.

Experimental Procedure

One hundred Rambouillet-type yearling ewes were obtained in May, 1959, from near Del Rio, Texas. Ten purebred yearling Hampshire rams were obtained from various Kansas breeders. The rams were weighed and scored for various characteristics by a group of department members prior to the start of the breeding season.

June 1, 1959, ewes were weighed and randomly divided into 10 lots of 10 ewes each.

Each ram was randomly assigned to a lot of ewes. From June 1 to September 1 the rams were turned with the ewes at night. Ewes were separated from rams and turned on pasture each day. Breeding dates were recorded.

Lambs were weighed at birth and every two to three weeks thereafter. They were self-fed a pelleted creep ration consisting of 55% alfalfa hay, 40% sorghum grain, and 5% molasses. Ten to 15 mgs. of Aureomycin were added per pound of pellets. Feed records are being obtained by sire groups. Lambs will suckle ewes until slaughtered.

When lambs weigh between 95 and 100 pounds each, they are sheared and scored for various characteristics, and various body measurements are taken. Lambs are slaughtered at the meats laboratory after measurements are taken. Various measurements and scores are being obtained on the carcasses.

Results and Discussion

Table 39 gives a few of the preliminary results.

One ram proved to be sterile. Forty-four Hampshire-sired lambs are still living and 35 had been slaughtered through the meats laboratory April 11, 1960.

There was considerable variation between rams in regard to general type score and live weight.

Birth weights and daily gains have not been corrected for sex or type of birth (single or multiple).

A more complete report will be made in the 1961 Feeders' Day Report.

Table 39

Preliminary 1959-1960 data on nine Hampshire rams and their lambs as of March 10, 1960.

Ram number	2	3	4	5	6	7	8	9	10
Ram type score[1]	81.5	90.7	77.8	76	79.7	74	86.6	82.3	90.5
Wt. of ram, June 1, 1959	159	206	166	158	153	166	171	174	195
Number of lambs	8	10	9	9	7	8	10	8	10
Av. birth wt., lbs.[2]	9.67	8.1	9.54	9.88	8.58	10.2	8.96	9.95	8.60
Av. daily gain, lbs.[2]	.678	.590	.601	.624	.639	.695	.593	.679	.603

1. Average general type score, with perfect score being 100.
2. Not corrected for sex or type of birth.

Hormone Implants for Young Lambs.

Carl Menzies

Considerable work has been conducted at this station and at the Garden City Branch Station to determine the value of various hormone treatments for feeder lambs. This experiment was designed to determine whether 3-mg. stilbestrol implants[1] or synovex implants[2] would increase rate of gain or affect yield or carcass grade of young lambs.

Experimental Procedure

Thirty-three two- to three-month-old lambs weighing from 25 to 70 pounds were used in this experiment. These lambs were from western commercial ewes sired by a Suffolk ram.

May 2, 1959, each lamb was designated as a control, implanted with 3 mgs. stilbestrol, or implanted with a synovex implant consisting of 2.5 mgs. estradiol benzoate, 25 mgs. progesterone, and 27.5 mgs. inert material. Treatment was allotted on the basis of weight, sex, and type of birth (single or twin).

Lambs nursed their mothers until June 1, when all were weaned. All lambs were fed in the same lot during the entire test. A pelleted ration of 35% sorghum grain, 5% cottonseed meal, 5% molasses, 2% salt, and 53% alfalfa hay was self-fed in a creep before weaning and in a self-feeder after weaning. Loose alfalfa hay was fed free choice in addition to the pellets.

Observations

Results of this experiment are presented in Table 40.

Control lambs gained faster, shrank less to market, and produced slightly higher-grading but lower-yielding carcasses than lambs implanted with stilbestrol or synovex. Wether lambs gained faster than ewe lambs regardless of treatment. Ewe lambs implanted with 3 mgs. stilbestrol gained about as fast as control ewe lambs; however, ewe lambs implanted with synovex implants gained less than the control ewe lambs. Wether lambs implanted with either 3 mgs. stilbestrol or synovex gained less than control wethers.

Since all lambs were fed together, feed efficiencies for different treatments could not be determined.

1. 3-mg. stilbestrol implants supplied by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
2. Synovex implants supplied by Syntex Animal Products Division of Foundation Laboratories, Inc., New York City.

Table 40

Hormone implants for young lambs.

May 2, 1959, to August 5, 1959.

Lot number	1	2	3
Treatment	Control	3-mg. stilbestrol implant	Synovex implant[1]
Number lambs per lot[2,3]	11	11	9
Days on feed	95	95	95
Initial wt. per lamb, lbs.	47.1	46.1	45.9
Final wt. per lamb, lbs.	101.7	96.6	94.4
Total gain per lamb, lbs.	54.6	50.5	48.6
Wether lambs[3]	59.2	51.0	53.5
Ewe lambs[3]	50.8	50.2	44.6
Av. daily gain per lamb, lbs.	.575	.532	.511
Wether lambs[3]	.623	.537	.563
Ewe lambs[3]	.535	.528	.469

1. Synovex implant consisted of 2.5 mgs. estradiol benzoate, 25 mgs. progesterone, and 27.5 mgs. inert material.
2. One lamb in treatment 3 was smothered and one lamb from this treatment group was slaughtered because of a prolapsed rectum.
3. Six lambs receiving treatments 1 and 2, and five on treatment 3, were ewes. Remaining lambs on each treatment were wethers.

Table 40 (Continued)

Av. % shrink to market	6.2	8.3	8.8
Av. USDA carcass grade[4]	8.5	7.8	8.1
Av. % yield[5]	47.7	49.0	48.8

4. Unrevised USDA carcass grade was based on prime, 14; choice, 11; good, 8; utility, 5; and cull, 2.

5. Based on average market weight for each treatment and average hot dressed carcass weight for each treatment.

Lamb Feeding Experiments, 1959-1960

Carl Menzies and A. B. Erhart

Lambs

The 575 white-faced lambs used in these tests were loaded on railroad cars at Suwanee, New Mexico, October 28. They cost $18.65 per cwt. including commission; weighed 66.7 pounds. They arrived in Garden City October 30 weighing 55.5 pounds. During the 16-day pretest period they received about 2 pounds of good-quality alfalfa hay plus 1¾ pounds of field-chopped dry-land grain sorghum stubble. At the end of the pretest period the lambs weighed about 70 pounds.

General Procedure

November 17 lambs were weighed, lotted, and started on test. Final weights were taken February 25 after 100 days of feeding.

Lambs in all lots (except those in lots 1, 4, and 7) were implanted at the start of the test with 3 mgs. stilbestrol. In a direct comparison of the value of 3 mgs. stilbestrol implants, lot 1 was fed a standard ration but not implanted. Lot 2 was fed a similar ration but received a 3-mg. stilbestrol implant. In a study of the practices of reimplanting and time of implanting, lots 3, 4, and 5 were fed similar rations. However, lambs in lots 3 and 5 received 3 mgs. stilbestrol at the start of the test. Lambs in lot 5 were given a second 3-mg. implant after 75 days on test and the lambs in lot 4 were implanted for the first time after 75 days on feed.

A comparison of the value of supplementing a sorghum grain, sorghum silage, and alfalfa hay ration with additional protein was made between lots 1 and 3.

Lambs in lot 11 were grazed on drilled irrigated wheat pasture. Weather was favorable for grazing until January 14, when snow covered wheat. Lambs were brought into drylot and fed 2 pounds alfalfa and 4 pounds sorghum silage each daily. They were returned to pasture February 1 but another snowstorm caused them to be returned to drylot and the above ration February 20.

An antibiotic, Oleandomycin, was fed at a level to supply 8 mgs. per lamb per day to lots 6 and 7. Lot 6 was compared with lots 3 and 7 and on the basis of the first 76 days lot 7 can be compared with lot 4.

Comparisons of sorghum, corn, and grain sorghum silages were made between lots 3, 8, 9, and 10. Lambs were fed all the silage they would consume. Lambs in lot 10 were started on grain sorghum silage but after 59 days were changed to a sorghum silage plus grain ration.

The sorghum silage yielded from 13½ to 19 tons per acre with an estimated grain yield of 45 to 50 bushels of grain per acre. An RS-610 variety grain sorghum was cut in the soft dough stage and yielded 6¼ tons silage per acre. It would have made about 65 bushels of grain per acre. The corn silage produced 15 tons per acre with a grain estimate of 70 bushels of well dented corn per acre.

Feed Prices

Sorghum grain	$ 1.30 per cwt.
Alfalfa hay	20.00 per ton
Sorghum silage	7.50 per ton
Corn silage	7.50 per ton
Grain sorghum silage	10.00 per ton
Cottonseed meal	66.00 per ton
Salt	1.00 per cwt.
Wheat pasture	.30 per head per month

Table 41

Comparisons of various drylot rations and irrigated wheat pasture for fattening lambs, Garden City, Kans., 1959-60.

Lot number	1	2	3	11
Treatment	Standard ration	Standard plus 3-mg. stilbestrol implant	Standard plus C.S.M. plus 3-mg. stilbestrol implant	Irrigated wheat pasture plus 3-mg. stilbestrol implant
Number lambs	50	50	50	25
Days on feed	100	100	100	100
Av. initial wt., lbs.	69.6	69.9	70.5	71.9
Av. final wt., lbs.	102.8	109.8	112.7	114.4
Av. total gain, lbs.	33.2	39.9	42.2	42.5
Av. daily gain, lbs.	.332	.399	.422	.425
Daily feed per lamb, lbs.:				
Whole sorghum grain	1.55	1.55	1.45	
Sorghum silage	3.59	3.59	3.75	.96[1]
Alfalfa hay	1.00	1.00	1.00	.53[1]
Cottonseed meal			.10	
Salt	.019	.033	.035	.022
Wheat pasture				free choice
Av. lbs. feed per cwt. gain:				
Whole sorghum grain	466.6	389.1	343.7	
Sorghum silage	1080.6	901.1	888.8	225.6
Alfalfa hay	301.0	251.0	237.0	124.1
Cottonseed meal			23.7	
Salt	6.0	7.5	9.5	4.7
Av. feed cost per cwt. gain[2]	$ 13.19	11.26	11.26	4.16
Av. feed cost per lamb[2]	$ 4.38	4.49	4.75	1.77
Cost per lamb on test	$ 13.43	13.44	13.61	13.88
Av. total cost per lamb[2]	$ 17.81	17.98	18.36	15.65
Av. total cost per cwt.[2]	$ 17.32	16.38	16.29	13.68

1. Lambs were fed hay and silage only when snow covered wheat pasture, at 2 lbs. hay and 4 lbs. silage per lamb per day.

2. Estimated cost of 3-mg. stilbestrol implants (2¢ each) is included in lots 2, 3, and 11.

Table 42

Results of tests with 3-mg. stilbestrol implants and an antibiotic for fattening lambs, Garden City, Kans., 1959-60.

Lot number	3	4	5	6	7
	STANDARD RATION PLUS				
Treatment[1]	3-mg. stilbestrol implant beginning of test	3-mg. stilbestrol implant after 76 days on feed	Reimplanted with 3 mgs. stilbestrol after 76 days on feed	3-mg. stilbestrol implant beginning of test plus an antibiotic	Antibiotic, no stilbestrol implant
Number lambs	50	48	50	50	50
Days on feed	100	100	100	100	100
Av. initial wt., lbs.	70.5	70.6	70.9	71.8	68.3
Av. final wt., lbs.	112.7	112.3	114.5	115.3	105.0
Av. total gain, lbs.	42.2	41.7	43.6	43.5	36.7
Av. daily gain entire test, lbs.	.422	.417	.436	.435	.367
Av. daily gain first 76 days, lbs.	.483	.396	.501	.486	.401
Av. daily gain last 24 days, lbs.	.229	.483	.229	.275	.258

1. Lambs in lots 6 and 7 were fed 8 mgs. Oleandomycin per lamb per day.

Table 42 (Continued)

Daily feed per lamb, lbs.:					
Whole sorghum grain	1.45	1.45	1.45	1.45	1.45
Sorghum silage	3.75	3.59	3.75	3.75	3.59
Alfalfa hay	1.00	1.00	1.00	1.00	1.00
Cottonseed meal	.10	.10	.10	.10	.10
Salt	.035	.028	.022	.030	.029
Av. lbs. feed per cwt. gain:					
Whole sorghum grain	343.7	348.0	332.1	333.5	394.4
Sorghum silage	888.8	861.6	858.8	862.5	976.5
Alfalfa hay	237.0	240.0	229.0	230.0	272.0
Cottonseed meal	23.7	24.0	22.9	23.0	27.2
Salt	9.5	7.2	4.6	6.9	8.2
Av. feed cost per cwt. gain[2 3]	$ 11.26	11.23	11.05	10.91	12.49
Av. feed cost per lamb[2 3]	$ 4.75	4.68	4.82	4.75	4.58
Cost per lamb on test	$ 13.61	13.63	13.68	13.86	13.18
Av. total cost per lamb[2 3]	$ 18.36	18.31	18.50	18.61	17.76
Av. total cost per cwt.[2 3]	$ 16.29	16.30	16.16	16.13	16.91

2. Estimated cost of 3-mg. stilbestrol implants (9¢ each) is included in lots 3, 4, 5, and 6.

3. Does not include cost of antibiotic.

Table 43

Comparisons of sorghum, corn, and grain sorghum silages for fattening lambs, Garden City, Kans., 1959-60.

Lot number	3	8	9	10
	Sorghum silage	Corn silage	Grain sorghum silage	Grain sorghum silage for 59 days, then sorghum silage[1]
Number lambs per lot	50	50	50	50
Days on feed	100	100	100	100
Av. initial wt., lbs.	70.5	70.9	71.7	71.6
Av. final wt., lbs.	112.7	115.5	105.6	110.7
Av. total gain, lbs.	42.2	44.6	33.9	39.1
Av. daily gain, lbs.	.422	.446	.339	.391
Daily feed per lamb, lbs.:				
Whole sorghum grain	1.45	1.45		.83
Sorghum silage	3.75			1.96
Corn silage		4.04		
Grain sorghum silage			5.57	2.41
Alfalfa hay	1.00	1.00	1.00	1.00
Cottonseed meal	.10	.10	.10	.10
Salt	.035	.033	.037	.027
3-mg. stilbestrol implants	Yes	Yes	Yes	Yes
Av. lbs. feed per cwt. gain:				
Whole sorghum grain	343.7	324.8		212.5
Sorghum silage	888.8			501.8
Corn silage		905.0		
Grain sorghum silage			1643.2	616.4
Alfalfa hay	237.0	224.0	295.0	256.0
Cottonseed meal	23.7	22.4	29.5	25.6

1. Fed the same as lot 9 for 59 days, then changed directly to sorghum silage ration as fed in lot 3.

Table 43 (Continued)

Salt	9.5	6.7	11.8	7.7
Av. feed cost per cwt. gain[2]	$ 11.26	10.86	12.53	11.43
Av. feed cost per lamb[2]	$ 4.75	4.84	4.25	4.47
Cost per lamb on test	$ 13.61	13.68	13.84	13.82
Av. total cost per lamb[3]	$ 18.36	18.52	18.09	18.29
Av. total cost per cwt.[2]	$ 16.29	16.03	17.13	16.52

2. Estimated cost of 3-mg. stilbestrol implants (9¢ each) is included in all lots.

Observations

Supplementing a standard sorghum grain, sorghum silage, and alfalfa hay ration with .10 pound of cottonseed meal resulted in slightly faster gains and improved feed efficiency. Feed cost per cwt. gain was the same as in the lot not fed additional cottonseed meal.

Lambs grazed on wheat pasture gained just as fast as lambs on the best drylot rations and produced much cheaper gains.

Implanting lambs with 3 mgs. stilbestrol, lot 3, resulted in increased gains, improved feed efficiency, and cheaper gains compared with lambs not implanted in lot 1. Average feed consumption per lamb was the same in both lots.

A second 3-mg. stilbestrol implant, given 76 days after an initial 3-mg. implant, failed to increase gains. Lambs implanted with 3 mgs. stilbestrol after 76 days on test gained considerably faster during the last 24-day period but slower during the first 76 days than lambs implanted at the beginning of the test. Total gain over the 100-day test was about the same for both treatments.

Lambs implanted with 3 mgs. stilbestrol and fed an antibiotic, lot 6, gained about the same as lambs in lot 3 not fed the antibiotic. However, they gained faster and more efficiently than lambs in lot 7 fed the antibiotic but not implanted.

Slightly faster, more efficient, and cheaper gains were made by lambs fed corn silage instead of sorghum silage. This was probably due to greater consumption of corn silage. Grain sorghum silage produced satisfactory but slower gains than rations containing sorghum or corn silages to which additional sorghum grain had been added. Lambs in lot 10, fed grain sorghum silage for 59 days and then changed to a sorghum silage and sorghum grain ration, gained faster than lambs that remained on the grain sorghum silage ration throughout the test. Lambs in lot 10 changed rations, with no setback. January 6, lambs in this lot were consuming an average ration of 5.4 pounds grain sorghum silage, 1 pound alfalfa hay, and .10 pound cottonseed meal. January 7, the ration was 3.6 pounds sorghum silage, 1 pound alfalfa hay, 1.6 pounds sorghum grain, and .10 pound cottonseed meal.

Only two of the original 575 lambs died. The cause of death was urinary calculi.

Charles Pfizer & Co., Inc., Terre Haute, Ind., furnished the stilbestrol implants and the antibiotic used in the tests.

Feed Prices Used in Beef Cattle Tests[1]

	1957-58	1958-59	1959-60
Sorghum grain, cwt., ground	$ 2.00	$ 2.10	$ 1.80
Sorghum grain pellets, cwt.		2.25	1.95
Corn, cwt., ground	2.30	2.25	2.20
Soybean meal, ton	67.00	80.00	75.00
Alfalfa hay, ton	16.00	11.00	16.00
Prairie hay, ton	14.00	11.50	14.00
Alfalfa hay pellets, ton		23.00	28.00
Forage sorghum silage, ton		5.00	5.00
Dehydrated green forage sorghum pellets, ton			25.00
Grain sorghum silage, ton		10.00	10.00
Dehydrated grain sorghum pellets, ton ($30, processing)		50.00	50.00
Bluestem pasture, summer, per head:			
Yearling	16.00	14.00	14.00
Two-year-old	20.00	18.00	18.00
Bluestem pasture, winter, per head per month:			
Calf	.50	.50	.50
Yearling	.75	.75	.75
Salt, cwt.	1.20	1.10	1.20
Ground limestone, cwt.	1.00	1.00	1.00
Bonemeal	6.00	6.15	6.00
Aurofac 2A, per pound	.60	.60	.60
Stilbestrol implants	.09	.09	.09
Tran-Q, per gram of tranquilizer		.80	.80
Dehydrated alfalfa pellets			59.00
Cobalt "bullets" each, for cattle			1.60

1. Prices reported here were used in calculating beef cattle feed costs, unless otherwise stated in individual reports.