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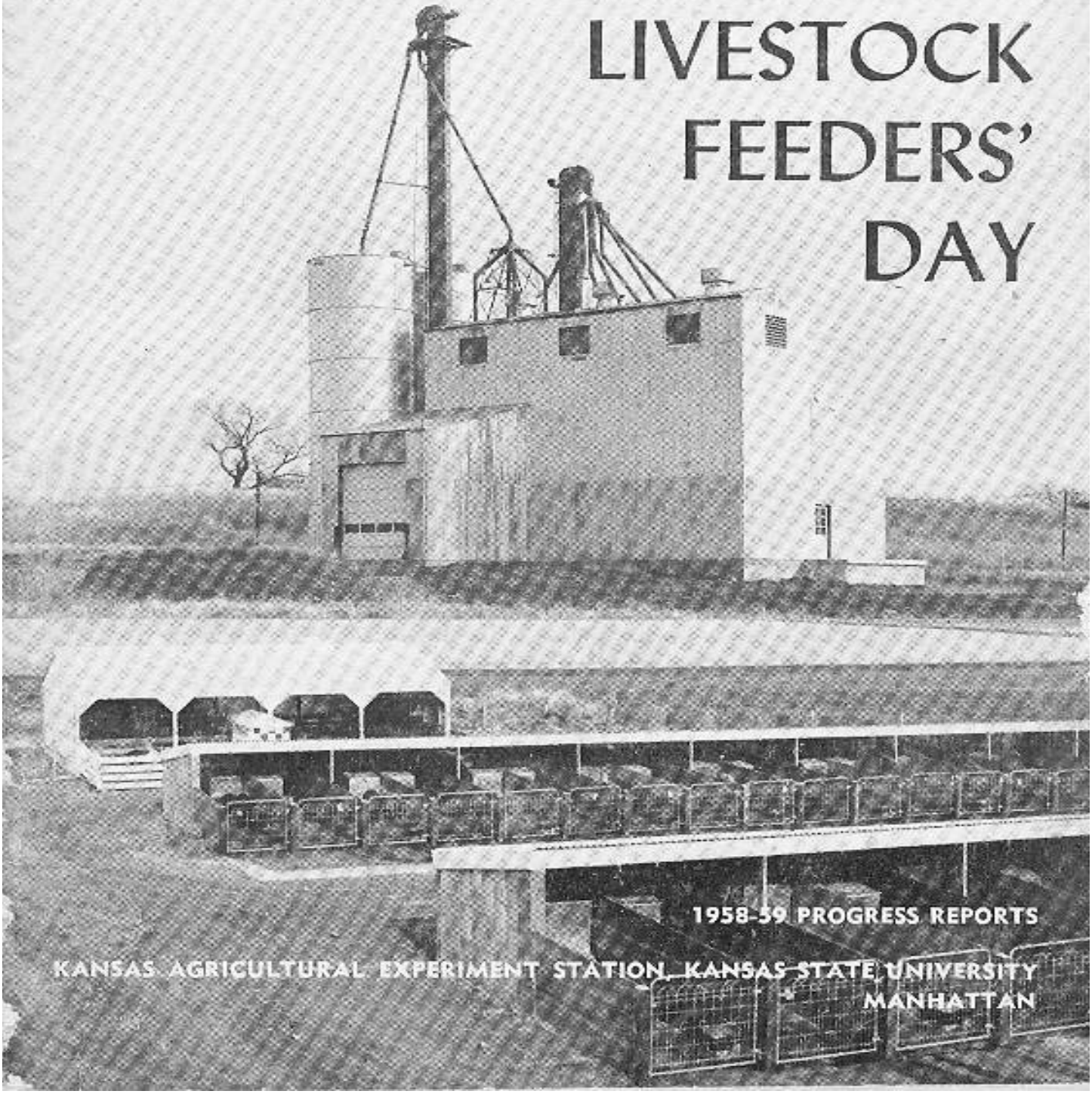
46th Annual

LIVESTOCK FEEDERS' DAY



1958-59 PROGRESS REPORTS

KANSAS AGRICULTURAL EXPERIMENT STATION, KANSAS STATE UNIVERSITY
MANHATTAN

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46th Annual Livestock Feeders' Day*

KANSAS STATE UNIVERSITY

MANHATTAN, KANSAS

Saturday, May 2, 1959

10:00 a.m.—Livestock Arena

Presiding—Ray E. Frisbie, McDonald, President, Kansas Livestock Association

Showing Experimental Lots in Arena—Animal Husbandry staff

- Cattle receiving pelleted, high-roughage rations
- Cattle receiving pelleted, high-energy rations
- Implanted cattle
- Tranquilizer-fed cattle

Animal Disease Control—Dr. M. J. Twiehaus, School of Veterinary Medicine

12:00 n. —Lunch, Arena

1:00 p.m.—Auditorium (Room 107)

Awards to Beef Production Contest Winners, W. H. Atzenweiler, Agricultural Commissioner, Kansas City Chamber of Commerce

1:15 p.m.—Greetings, Hon. George Docking, Governor of the State of Kansas

1:30 p.m.—Compiled Reviews with Specific Recommendations on:

I. Feed Additives Panel—Richardson, Koch, Menzies, Mackintosh, Taylor

a. Stilbestrol
- In feed
- Implanting and reimplanting
- For wintering animals
- For grazing animals
- For full-fed animals
- Carcass considerations

b. Antibiotics, enzymes, tranquilizers, trace minerals

II. Pasture Utilization and Management Panel—E. F. Smith, K. L. Anderson, L. E. Anderson, J. R. Brethour, and J. L. Launchbaugh
- Pasture burning
- Full season stocking, deferred and rotational grazing
- Rate of stocking
- Brush and weed control
- Supplementing winter and summer pasture

*Contribution No. 231, Department of Animal Husbandry; 582, Department of Chemistry; 685, Department of Agronomy; and 26, Garden City Branch Station, all of the Kansas Agricultural Experiment Station, Manhattan.

6:30 p.m.—Kansas State Union

Banquet for parents and visiting stockmen and ladies, Block and Bridle Club

Honoring—William Ljungdahl, Menlo
Earl Brookover, Garden City
The late O. W. (Cap) Lynam, Burdette

FOR THE LADIES

Friday, May 1, 1959

6:30 p.m.—Dinner, Gillett Hotel

Kansas Cow Belles and all visiting ladies (Make reservations with Mrs. C. W. McCampbell, 1127 Thurston, Manhattan)

Saturday, May 2, 1959

9:30 a.m.—Animal Industries Building (Room 103)

Coffee, by Animal Husbandry wives

10:30 a.m.—Auditorium (Room 107), Animal Industries Building

Program sponsored jointly by School of Home Economics and Department of Animal Husbandry

Presiding—Mrs. Ray E. Frisbie, McDonald, President, Kansas Cow Belles

Demonstration—"Hawaiian Foods," Janice Dahl and Janet Madsen, Students in Home Economics

12:00 n. —Lunch, Arena

6:30 p.m.—Block and Bridle Banquet

Some recent additions to the animal husbandry department are illustrated on the front cover.

The new purebred beef cattle barn was completed and has been in use since September, 1957. It has one wing 32 feet by 120 feet, and another 32 feet by 50 feet. It has movable partitions which can be arranged to form pens of various sizes and numbers. Feed storage is provided overhead. Two rooms, to accommodate four boys, are provided.

The grain elevator and feed processing plant is only partially completed. Eventually it will store 30,000 bushels of grain, and will be equipped for various means of processing, blending, and mixing.

The swine performance testing station was completed in the fall of 1958 and a group of pigs has already gone through the test, and the tested boars sold. Construction of this station was financed by the Kansas Swine Improvement Association. Personnel for the operation of the station are furnished by the Department of Animal Husbandry.

Beef Cattle

The Effect of Implanting Beef Heifers on a Fattening Ration with Hormones or Hormonelike Substances. Projects 536 and 537.

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

The increase in rate of gain from feeding stilbestrol to heifers is not so good as that obtained with steers. Implanting heifers with levels of stilbestrol recommended for steers results in undesirable side effects such as udder and teat development, high tailheads, and prolapse of the vagina in many instances. This is the second test designed to study the effect of low-level stilbestrol implanting (12 mgs.) and Synovex heifer implants (SH-7 contains 100 mgs. testosterone and 20 mgs. estradiol benzoate) on heifers being fattened for slaughter. Sixty heifers, six lots of 10 animals each, in Projects 536 and 537 were used in this test. Three animals from each lot were randomly selected to receive either the stilbestrol or Synovex implant, thus giving 18 animals per treatment. The remaining 4 animals per lot, total of 24, served as controls.

Results and Observations

Results of this test are shown in Table 1. Both implants produced an increase in rate of gain; however, greater gains were obtained with Synovex. Average daily gains in a previous test were 1.76, 2.03, and 1.89 pounds, respectively, for control, 12 mgs. stilbestrol implant, and Synovex-heifer implants. When both tests are considered, there was no difference in rate of gain between the two types of implant. The average increase in rate of gain was about 0.2 pound daily for both implants. There were practically no differences in carcasses based upon conformation, grade, quality, and value per hundred pounds.

Table 1

Results of implanting stilbestrol and Synovex Heifer (SH-7) in beef heifers on fattening rations.

March 21, 1958, to August 2, 1958—134 days.

Treatment	Control	12 mgs. stilbestrol implant	Synovex Heifer-7 implant[7]
No. heifers per treatment	24	18	18
Av. initial wt., lbs.	569.4	582.2	584.7
Av. final wt., lbs.	804.4	829.4	855.8
Av. daily gain per heifer, lbs.	1.75	1.84	2.02
Av. carcass conformation grade[1]	12.6	13.0	12.8
Av. carcass grade:[1]			
Before ribbing	11.4	11.2	11.0
After ribbing	11.8	11.8	11.3
Av. fat thick. at 12th rib, vis. est.[2]	3.7	3.7	3.8
Av. uniformity of fat dist.[3]	4.0	3.8	3.9
Av. degree of marbling[4]	7.3	7.1	7.6
Av. size ribeye, vis. est.[5]	4.7	4.3	4.3
Av. size ribeye, sq. in.	9.5	9.8	10.5
Av. degree of firmness[6]	4.1	4.4	4.6
Av. carcass value per cwt., Ch 41¢ and G 38¢	$38.40	38.51	38.69

1. Based on top choice 15, av. choice 14, low choice 13, top good 12, av. good 11, low good 10.
2. Based on thick 2, moderate 3, modest 4, slightly thin 5.
3. Based on uniform 2, moderate 3, modest 4, slightly uneven 5.
4. Based on slightly abundant 4, moderate 5, modest 6, small amount 7, slight amount 8.
5. Based on large 2, moderately large 3, modestly large 4, slightly small 5.
6. Based on firm 2, moderately firm 3, modestly firm 4, slightly firm 5.
7. 100 mgs. testosterone and 20 mgs. estradial benzoate.

Self-Feeding a Mixture of Molasses, Urea, Water, and Phosphoric Acid to Beef Heifers. Project 536.

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

This is the second test to study the value of self-feeding a mixture of blackstrap molasses, urea, water, and phosphoric acid as the protein supplement in a wintering and fattening ration of beef cattle.

Experimental Procedure

Thirty Hereford heifer calves from the same herd were divided as equally as possible on the basis of weight and conformation into three lots of 10 animals each. During the wintering phase, animals in all lots received all of the sorghum silage they would clean up each day. The remainder of the daily ration was as follows:

Lot 7. Free-choice mixture, 77 percent blackstrap molasses, 3 percent phosphoric acid, 10 percent urea, and 10 percent water.

Lot 8. Free-choice mixture, 77 percent blackstrap molasses, 3 percent phosphoric acid, 10 percent urea, and 10 percent water plus 0.5 pound soybean meal and 1.5 pounds of sorghum grain.

Lot 9. Control, 1 pound soybean oil meal and 2 pounds of sorghum grain.

At the end of the wintering phase, sorghum grain was fed in all lots. It was gradually increased until the animals were self-fed grain. Silage was used as the roughage for the first 25 days and then replaced by prairie hay fed free choice. Protein supplements continued on the same basis as in the wintering phase.

Salt and a mixture of equal parts of salt, steamed bonemeal, and limestone were self-fed free choice to all lots. Water was supplied by electrically-heated automatic fountains.

Results and Observations

Results of this test are shown in Table 2. The animals started eating the liquid supplements as soon as they were placed before them. No toxic effects were ever observed. It is believed that the phosphoric acid aids in preventing toxicity as well as supplying an excellent source of phosphorus. Lot 7 animals did not gain as well during the wintering phase as those in lots 8 and 9 that received a natural protein supplement. However, a half pound of natural protein supplement with the liquid supplement produced gains as good as all natural protein. Thus, it is evident again that all nonprotein-nitrogen is not so efficient in a wintering ration (high roughage) as when some natural protein is supplied.

During the fattening phase, animals in lot 7 gained faster than those in lots 8 and 9. This shows that animals that didn't gain as much during the winter and were thinner gain faster when put on a fattening ration. Also, nonprotein-nitrogen (urea) is more efficient in a fattening ration than in a wintering ration. The over-all (wintering and fattening) average daily gain for all three lots was the same. There were no significant differences in shrink to market, dressing percentage, or carcass quality. Liquid protein supplements, as used in this test, can be used very satisfactorily in beef cattle rations. Liquid protein supplements are of no more value, if as much, than natural protein supplements. Therefore, the comparative cost of a supplement and the purpose for which it is to be used should determine the one to be purchased.

Table 2

Results of self-feeding a mixture of molasses, urea, water, and phosphoric acid to beef heifer calves.

	7	8	9
Wintering phase—December 12, 1957, to March 21, 1958—100 days.			
Lot number	10	10	10
Number calves per lot	441.5	441.5	441.0
Av. initial wt., lbs.	560.0	590	585
Av. final wt., lbs.	1.18	1.48	1.44
Av. daily gain per calf, lbs.			
Av. daily ration, lbs.:			
Sorghum silage	27.6	25.9	25.9
Sorghum grain		1.5	2.0
Soybean oil meal		0.5	1.0
Molasses mixture[1]	2.15	2.39	
Salt	.07	.04	.09
Mineral mixture[2]	.09	.11	.12
Lbs. feed per cwt. gain:			
Sorghum silage	2333	1747	1799
Sorghum grain		101	138.9
Soybean oil meal		33.7	69.4
Molasses mixture[1]	181.4	160.7	
Salt	5.6	2.4	6.1
Mineral mixture	7.8	5.7	8.7
Cost per cwt. gain[3]	$ 15.71	15.88	11.71
Fattening phase—March 21, 1958, to August 2, 1958—134 days.			
Lot number	7	8	9
Number heifers per lot	10	10	10
Av. initial wt., lbs.	560.0	590.0	585.0
Av. final wt., lbs.	831.5	835.0	834.5
Av. total gain, lbs.	271.5	245.0	249.5
Av. daily gain per heifer, lbs.	2.03	1.83	1.86
Av. daily ration, lbs.:			
Sorghum silage[4]	21.5	24.1	21.5
Prairie hay[5]	4.6	4.7	4.5
Sorghum grain	16.5	16.5	15.8
Soybean oil meal		0.5	1.0
Molasses mixture[1]	1.7	1.3	
Mineral mixture[2]	.04	.05	.06
Salt	.05	.04	.06
Pounds feed per 100 lbs. gain:			
Sorghum silage	198	246	215
Prairie hay	184	211	197
Sorghum grain	814	904	848
Soybean oil meal		27	54
Molasses mixture	82	70	
Mineral mixture	2.2	2.6	3.0
Salt	2.6	2.4	3.0
Feed cost per 100 lbs. gain[3]	$ 21.62	24.26	21.09
Summary—Wintering and fattening—December 12, 1957, to August 2, 1958—234 days.			
Lot number	7	8	9
Av. total gain, lbs.	390.0	393.5	393.5
Av. daily gain, lbs.	1.67	1.68	1.68
Av. feed cost per 100 lbs. gain	$ 19.84	21.10	17.66
Net per animal	−2.95	−3.26	6.38

1. Mixture contained 77% blackstrap molasses, 3% phosphoric acid, 10% urea, and 10% water.

2. Equal parts of limestone, steamed bonemeal, and salt.

3. Based on silage $7 per ton, prairie hay $14 per ton, grain $2 per cwt., soybean oil meal $70 per ton, molasses mixture $80 per ton, mineral mixture $50 per ton, and salt $20 per ton.

4. Sorghum silage fed only first 25 days.

5. Prairie hay fed last 109 days.

Table 2 (Continued)

% shrink to market	4.5	3.6	4.1
Av. dress. % based on final feedlot wt. (including 2% cooler shrink)	56.6	57.6	56.4
Av. dress. % based on market wt.	59.2	59.7	58.8
Av. carcass grade before ribbing[6]	11.2	11.2	11.1
Av. carcass grade after ribbing[6]	11.3	11.9	11.2
Av. fat thickness at 12th rib, vis. est.[7]	3.9	3.6	3.7
Av. uniformity of fat distribution[8]	4.1	3.8	3.8
Av. degree of marbling[9]	7.4	7.3	7.6
Av. size ribeye, vis. est.[10]	4.5	4.3	4.6
Av. size ribeye, sq. in.	10.2	9.8	9.8
Av. degree of firmness[11]	4.6	4.2	4.6
Av. initial cost per animal @ 24¢/lb.	105.96	105.96	105.84
Av. total feed cost	$ 77.24	83.02	69.48
Av. total cost animal and feed	$183.20	188.98	175.32
Av. carcass value (Ch 41¢ and G 38¢)	180.25	185.72	181.70

6. Based on top choice 15, av. choice 14, low choice 13, top good 12, av. good 11, low good 10.

7. Based on thick 2, moderate 3, modest 4, slightly thin 5.

8. Based on uniform 2, moderate 3, modest 4, slightly uneven 5.

9. Based on slightly abundant 4, moderate 5, modest 6, small amount 7, slight amount 8.

10. Based on large 2, moderately large 3, modestly large 4, slightly small 5.

11. Based on firm 2, moderately firm 3, modestly firm 4, slightly firm 5.

Fundamental Studies of Sorghum Roughages and Grains. I. A Study of the Value of Feeding the Grain Sorghum Plant as Silage and as Dehydrated Pellets. II. A Study of the Value of Pelleting Sorghum Grain. Project 222.

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

Combine-type sorghum grain is widely grown in Kansas and normally only the grain is harvested. In many instances, moisture conditions are such at harvest time that grain cannot be stored without artificially drying. Sometimes there is danger of loss to immature grain because of an early freeze. One part of this test was to study the feasibility of harvesting the entire grain sorghum plant as silage or as dehydrated pellets. Previous tests have indicated greater utilization of finely ground pelleted sorghum grain than cracked sorghum grain. The second part of the test was further work in comparing the two methods of preparation. This report is on the wintering phase of the feedlot test.

Experimental Procedure

Forty Hereford steer calves from the same herd were divided as equally as possible on the basis of weight and conformation into four lots of 10 animals each. Grain sorghum from the same field, estimated to yield 45 bushels per acre, was used to make the grain sorghum silage and dehydrated grain sorghum pellets. It produced approximately 6 tons of silage or 2½ tons of dehydrated pellets per acre. Grain from another source was used for cracking and pelleting. The daily ration for all animals consisted of 4 pounds alfalfa hay and 0.5 pound soybean oil meal plus the following:

Lot 1. Average of 7.65 pounds dehydrated grain sorghum pellets.

Lot 2. Average of 20.55 pounds grain sorghum silage.

Lot 3. Average of 14.1 pounds Atlas sorghum silage and 4 pounds cracked sorghum grain.

Lot 4. Average of 12.65 pounds Atlas sorghum silage and 4 pounds finely ground pelleted sorghum grain.

An attempt was made to keep the dry matter intake the same in lots 1 and 2. Salt and a mineral mixture of 2 parts steamed bonemeal and

1 part salt were fed free choice. Water was supplied in automatic electrically-heated water fountains.

Results and Observations

Results of the wintering phase of this test are shown in Table 3. Rate of gain was the same in lots 1 and 2. The gains were economical in lot 2; however, the cost of dehydrating and pelleting considerably increased the cost of gain in lot 1. The silage and pellets were palatable and no digestive disturbances or other trouble were experienced during the test. Animals in lot 4, receiving the finely ground pelleted grain, gained slightly faster and utilized their feed more efficiently than those that received the cracked grain (lot 3). The difference was great enough to more than offset the additional cost of pelleting. The fattening phase of this test is now in progress. All the hay has been removed from lots 1 and 2 and grain increased in lots 3 and 4.

Table 3

Comparative results with (1) dehydrated grain sorghum pellets and grain sorghum silage, and (2) cracked sorghum grain and finely ground pelleted sorghum grain in beef steer wintering rations.

Wintering phase—December 2, 1958, to March 11, 1959—100 days.

Lot number	1	2	3	4
Number calves per lot	10	10	10	10
Av. initial wt., lbs.	415.5	416	418	424
Av. final wt., lbs.	550.5	552	568.5	586.5
Av. daily gain per calf, lbs.	1.35	1.36	1.51	1.63
Av. daily ration, lbs.:				
Alfalfa hay	4	4	4	4
Grain sorghum silage		20.55		
Atlas sorghum silage			14.1	12.65
Dehydrated grain sorghum pellets	7.65			
Cracked sorghum grain			4	
Pelleted sorghum grain				4
Soybean oil meal	.5	.5	.5	.5
Salt	.035	.018	.052	.016
Bonemeal-salt mixture	.085	.061	.061	.039
Feed per cwt. gain, lbs.:				
Alfalfa hay	296.3	294.1	264.9	245.3
Grain sorghum silage		1511		
Atlas sorghum silage			933.8	776.1
Dehydrated grain sorghum pellets	566.7			
Cracked sorghum grain			264.9	
Pelleted sorghum grain				245.3
Soybean oil meal	37	36.8	33.1	30.7
Salt	2.6	1.3	3.4	1.0
Bonemeal-salt mixture	6.3	4.5	4.0	2.4
Feed cost per cwt. gain[1]	$17.59	10.86	10.89	10.16

1. Based on ingredient prices given on inside of back cover.

The Value of Implanting Beef Steer Calves on a Fattening Ration with Stilbestrol and Synovex Pellets. Project 222.

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

Stilbestrol and Synovex implants are used with beef cattle to stimulate increased gains. This test was planned to study level of stilbestrol implant and the effect of stilbestrol and Synovex implants on rate of gain and carcass quality. Animals within each lot in Project 222 were randomly allotted to the various treatments of this test. Treatments were control

(no implant), 24 mgs. stilbestrol implant, 36 mgs. stilbestrol implant, and Synovex implant. All implants were made at the base of the ear.

Results and Observations

Results of this test are shown in Table 4. All implants greatly improved rate of gain; however, Synovex-S showed a greater increase in this test. Average daily gains in a previous test were 1.94, 2.54, 2.31, and 2.22 pounds, respectively, for control, 24 and 36 mgs. of stilbestrol and Synovex-S. When both tests are considered, implants of 24 mgs. of stilbestrol produced the highest rate of gain followed by Synovex and 36 mgs. of stilbestrol. It is interesting that carcass conformation scores tended to be higher for animals implanted with stilbestrol; however, there was a tendency for carcasses from all implanted animals to grade slightly lower. The differences were small, but they did show up when average value per 100 pounds of carcass was calculated. The design of the test did not permit feed efficiency data to be gathered.

Table 4

Results of implanting beef steer calves on fattening rations with 24 and 36 mgs. of stilbestrol and Synovex-S pellets.

March 17, 1958, to August 2, 1958—138 days.

Treatment	Control	24 mgs. stilbestrol	36 mgs. stilbestrol	Synovex-S[7]
Number animals per treatment	12	10	10	10
Av. initial wt., lbs.	615.4	630.0	632.5	631.0
Av. final wt., lbs.	859.2	932.5	931.0	955.0
Av. daily gain, lbs.	1.77	2.19	2.16	2.35
Av. carcass conformation grade[1]	13.1	13.4	13.6	13.0
Av. carcass grade before ribbing[1]	11.3	11.5	11.3	11.4
Av. carcass grade after ribbing[1]	11.1	10.6	10.3	10.7
Av. fat thickness at 12th rib, vis. est.[2]	3.8	3.4	3.9	3.5
Av. uniformity of fat distribution[3]	3.8	3.7	4.0	4.0
Av. degree of marbling[4]	7.3	7.8	7.9	7.8
Av. size of ribeye, vis. est.[5]	4.3	4.5	4.7	4.3
Av. size ribeye, sq. in.	10.0	10.2	10.2	10.2
Av. degree of firmness[6]	4.7	4.8	4.7	4.5
Av. value carcass per cwt., Ch 41¢ and G 38¢	$38.77	38.34	38.00	38.00

1. Based on top choice 15, av. choice 14, low choice 13, top good 12, av. good 11, low good 10.
2. Based on thick 2, moderate 3, modest 4, slightly thin 5.
3. Based on uniform 2, moderately uniform 3, modestly uniform 4, slightly uneven 5.
4. Based on modest amount 6, small amount 7, slight amount 8, traces 9.
5. Based on large 2, moderately large 3, modestly large 4, slightly small 5.
6. Based on firm 2, moderately firm 3, modestly firm 4, slightly firm 5.
7. 200 mgs. progesterone and 20 mgs. estradial benzoate.

Fundamental Studies of Sorghum Roughages and Grains. A Study of the Value of Pelleting Sorghum Grain. Project 222.

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

A previous test with steers indicated improved efficiency of sorghum grain in a fattening ration when it was finely ground and pelleted. This test was an effort to further evaluate finely-ground, pelleted sorghum grain in beef cattle rations.

Experimental Procedure

Forty Hereford steer calves from the same herd were divided as equally as possible, on the basis of weight and conformation, into four lots of 10

animals each. Two additional steers became available 10 days after the test started and they were added to lot 3. The daily wintering ration consisted of 1 pound soybean oil meal, 5 pounds grain, 2 pounds alfalfa hay, and all the sorghum silage they would clean up. Salt and a mineral mixture of 2 parts steamed bonemeal and 1 part salt were fed free choice. The grain used was as follows: Lot 1, rolled sorghum grain; lot 2, cracked corn; lot 3, finely-ground, pelleted sorghum grain; lot 4, finely-ground sorghum grain. The fattening ration was the same except silage was removed after 32 days. An attempt was made to maintain the same level of grain in all lots.

Results and Observations

Results of this test are shown in Table 5. Rate of gain and feed efficiency during the wintering phase were exceptionally good. The slightly lower rate of gain in lot 4 was caused primarily by two animals which had to be treated for foot rot.

The results of the fattening phase are shown; however, there is some doubt as to their value because of a severe outbreak of foot rot in lot 3 about midway of the fattening period. Seven animals were affected and several lost as much as 40 pounds before recovering. There was one case in each of lots 1 and 2, and also a chronic bloater in lot 1.

Table 5

Comparative results with cracked corn, cracked sorghum grain, finely-ground sorghum grain and finely-ground, pelleted sorghum grain in beef steer calf rations.

Wintering phase—December 7, 1957, to March 17, 1958—100 days.

Lot number	1	2	3	4
Number calves per lot	10	10	12	10
Av. initial wt., lbs.	431	432	426.3	432
Av. final wt., lbs.	636	628	623.3	620
Av. daily gain per calf, lbs.	2.05	1.96	2.00	1.88
Av. daily ration, lbs.:				
Sorghum silage	19.2	17.6	17.7	17.8
Alfalfa hay	2.0	2.0	2.0	2.0
Soybean oil meal	1.0	1.0	1.0	1.0
Cracked sorghum grain	5.0			
Corn		5.0		
Pelleted sorghum grain			5.0	
Finely-ground sorghum grain				5.0
Lbs. feed per cwt. gain:				
Sorghum silage	938	897	870	945
Alfalfa hay	97.6	102	100	106.4
Soybean oil meal	48.8	51.0	50.0	53.2
Cracked sorghum grain	243.9			
Corn		255.1		
Pelleted sorghum grain			250.0	
Finely-ground sorghum grain				266.0
Feed cost per cwt. gain[1]	$10.57	11.54	10.76	11.26

Fattening phase—March 17, 1958, to August 2, 1958—138 days.

Lot number	1	2	3	4
No. steers per lot	10	10	12	10
Av. initial wt., lbs.	636.0	628.0	623.3	620.0
Av. final wt., lbs.	891	931.5	904.6	941.5
Av. total gain, lbs.	255	303.5	281.3	321.5
Av. daily gain per steer, lbs.	1.85	2.20	2.04	2.33
Av. daily ration, lbs.:				
Sorghum silage[2]	16.7	14.5	11.1	14.5
Alfalfa	6.2	5.2	3.4	5.5

1. Based on silage $7 per ton, alfalfa hay $16 per ton, soybean oil meal $70 per ton, ground sorghum grain $2 per cwt., pelleted sorghum grain $2.10 per cwt., mineral mixture $50 per ton, salt $20 per ton.
2. Sorghum silage fed only first 32 days.

Table 5 (Continued)

Cracked sorghum grain	13.3			
Corn		13.0		
Pelleted sorghum grain			12.6	
Finely-ground sorghum grain				13.2
Soybean oil meal	1.0	1.0	1.0	1.0
Mineral mixture	0.04	0.03	0.03	0.04
Salt	0.04	0.03	0.03	0.03
Lbs. feed per cwt. gain, lbs.:				
Sorghum silage	210	152	126	145
Alfalfa	336	238	167	238
Cracked sorghum grain	720			
Corn		591		
Pelleted sorghum grain			619	
Finely-ground sorghum grain				569
Soybean oil meal	54	45	49	43
Mineral mixture	2.2	1.5	1.6	1.6
Salt	2.4	1.5	1.4	1.2
Cost per cwt. gain[1]	$19.80	17.67	16.55	15.35
Summary—Wintering and fattening—December 7, 1957, to August 2, 1958—238 days.				
Av. total gain, lbs.	460	499.5	478.3	509.5
Av. daily gain, lbs.	1.93	2.10	2.01	2.14
Av. feed cost per cwt. gain	$15.69	15.27	14.17	13.84
Av. initial cost per animal (27¢ per lb.)	$116.37	116.64	115.10	116.64
Av. total feed cost per animal	$72.16	76.25	67.75	70.52
Av. total cost, animals and feed	$188.53	192.89	182.85	187.16
Av. carcass value (Ch 41¢ and G 38¢)	$192.51	214.70	202.28	211.73
Net per animal	$3.98	21.81	19.43	24.57
Percent shrink to market	3.6	3.5	3.5	3.7
Av. dressing % (inc. 2% cooler shrink):				
Based on final feedlot wt.	56.9	60.1	58.1	58.7
Based on market wt.	59.0	62.3	60.2	61.0
Av. carcass grade before ribbing[3]	10.5	11.7	11.7	11.6
Av. carcass grade after ribbing[3]	9.9	10.7	11.0	11.1
Av. fat thickness at 12th rib, vis. est.[4]	4.2	3.4	3.5	3.6
Av. uniformity of fat distribution[5]	4.2	3.8	3.6	4.0
Av. degree of marbling[6]	8.2	7.6	7.6	7.4
Av. size ribeye, vis. est.[7]	4.7	4.5	4.4	4.2
Av. size ribeye, sq. in.	10.3	10.2	9.9	10.2
Av. degree of firmness[8]	5.0	4.5	4.5	4.7

1. Based on top choice 15, av. choice 14, low choice 13, top good 12, av. good 11, low good 10.
4. Based on thick 2, moderate 3, modest 4, slightly thin 5.
5. Based on uniform 2, moderately uniform 3, modestly uniform 4, slightly uneven 5.
6. Based on modest amount 6, small amount 7, slight amount 8, traces 9.
7. Based on large 2, moderately large 3, modestly large 4, slightly small 5.
8. Based on firm 2, moderately firm 3, modestly firm 4, slightly firm 5.

Self-Feeding Ammoniated Blackstrap Molasses to Beef Heifers. Project 537.

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

This is the second test to study the value of ammoniated blackstrap molasses when self-fed in beef cattle rations.

Experimental Procedure

Forty Hereford heifer calves from the same herd were divided as equally as possible on the basis of weight and conformation into four lots of 10

animals each. Animals in all lots received all the sorghum silage they would clean up each day. The remainder of the daily ration for the wintering phase was as follows:

Lot 9. Control. 1 pound soybean oil meal and 2 pounds sorghum grain.

Lot 10. Free-choice ammoniated blackstrap molasses (16 percent protein equivalent) and 0.5 pound soybean oil meal.

Lot 11. Free-choice ammoniated blackstrap molasses (16 percent protein equivalent), 0.5 pound soybean oil meal, and 1.5 pounds sorghum grain.

Lot 12. Free-choice ammoniated blackstrap molasses (16 percent protein equivalent) and 2 pounds sorghum grain. At the beginning of the fattening phase, sorghum grain was added in all lots. The grain was increased until the animals were on full feed and then the grain was fed free choice. After 25 days, prairie hay replaced sorghum silage as the roughage and was fed free choice. The protein supplement portion of the ration was continued the same as in the wintering phase.

Salt and a mineral mixture of equal parts limestone, steamed bonemeal, and salt were fed free choice in all lots. Water was provided by electrically-heated water fountains.

Results and Observations

Results of this test are shown in Table 6. No unusual behavior or toxic effects were observed even though the rate of consumption of ammoniated molasses was high during the wintering phase. Rate of gain was very satisfactory in all lots receiving ammoniated molasses; however, results indicate that a small amount of natural protein concentrate improves the ration.

Rate of gain during the fattening phase was the same in all lots except number 11. Lots 10 and 11 were fed identical rations; however, there was a difference of 0.17 pound average daily gain between the lots. This points out differences that may be observed even when the same ration is used, and the fallacy of forming a conclusion from one test. There were no significant differences in shrink to market, dressing percentage, or carcass grade. This and previous tests show that ammoniated molasses is a safe and satisfactory product to use in beef cattle rations.

Table 6

Results of self-feeding ammoniated blackstrap molasses to beef heifer calves.

Wintering phase—December 12, 1957, to March 21, 1958—100 days.				
Lot number	9	10	11	12
No. calves per lot	10	10	10	10
Av. initial wt., lbs.	441	441.5	442.5	440.5
Av. final wt., lbs.	585	574	591	567
Av. daily gain, lbs.	1.41	1.32	1.48	1.26
Av. daily ration, lbs.:				
Sorghum silage	25.9	24.5	23.3	23.2
Sorghum grain	2.0		1.5	2.0
Soybean oil meal	1.0	0.5	0.5	
Amm. blackstrap molasses[1]		4.58	5.11	5.09
Salt	.09	.07	.07	.12
Mineral mixture[2]	.12	.09	.08	.08
Lbs. feed per cwt. gain:				
Sorghum silage	1799	1851	1569	1832
Sorghum grain	138.9		101	158.1
Soybean oil meal	69.4	37.7	33.7	
Amm. blackstrap molasses[1]		345.4	344.1	402.7
Salt	6.1	5.5	4.5	9.2
Mineral mixture	8.7	6.9	4.4	6.6
Cost per cwt. gain	$11.71	15.77	16.55	18.92
Fattening phase—March 21, 1958, to August 2, 1958—134 days.				
Av. initial wt., lbs.	585.0	574.0	591.0	567.0

1. 16% protein equivalent.
2. Equal parts steamed bonemeal, limestone and salt.

Table 6 (Continued)

Av. final wt., lbs.	834.5	824.5	819.0	891.5
Av. total gain, lbs.	249.5	250.5	228.0	252.5
Av. daily gain per heifer, lbs.	1.86	1.87	1.70	1.88
Av. daily ration, lbs.:				
Sorghum silage[4]	21.5	21.5	21.3	21.3
Prairie hay[5]	4.5	3.8	3.8	4.0
Sorghum grain	15.8	16.7	15.8	17.4
Soybean oil meal	1.0	0.5	0.5	
Amm. molasses		0.8	1.0	1.5
Mineral mixture	.06	.04	.02	.03
Salt	.06	.05	.05	.06
Lbs. feed per 100 lbs. gain:				
Sorghum silage	215	215	234	211
Prairie hay	197	166	181	172
Sorghum grain	848	892	928	925
Soybean oil meal	54	27	29	
Amm. molasses		42	58	80
Mineral mixture	3.0	2.4	1.4	1.6
Salt	3.0	2.8	2.8	3.0
Cost per 100 lbs. gain[3]	$21.09	21.74	23.04	22.30
Summary—Wintering and fattening—December 12, 1957, to August 2, 1958—234 days.				
Lot number	9	10	11	12
Av. total gain, lbs.	393.5	383.0	376.5	379.0
Av. daily gain, lbs.	1.68	1.64	1.61	1.62
Av. feed cost per cwt. gain	$17.66	19.68	20.48	21.18
Av. initial cost per animal @ 24¢/lb.	$105.84	105.96	106.20	105.72
Av. total feed cost per animal	$69.48	75.36	77.11	80.26
Av. total cost, animal and feed.	$175.32	181.32	183.31	185.98
Av. carcass value (Ch 41¢ and G 38¢)	$181.70	179.70	186.13	179.92
Net per animal	$6.38	−1.62	2.82	−6.06
% shrink to market	4.1	3.9	4.3	3.8
Av. dressing % (inc. 2% cooler shrink): based on final feedlot wt.	56.4	57.4	57.8	57.3
Av. dressing % based on market wt.	58.8	59.7	60.4	59.6
Av. carcass grade before ribbing[6]	11.1	11.4	11.3	11.2
Av. carcass grade after ribbing[6]	11.2	11.5	12.4	11.5
Av. fat thickness at 12th rib, vis. est.[7]	3.7	3.5	3.7	4.1
Av. uniformity of fat distribution[8]	3.8	4.2	3.7	3.9
Av. degree of marbling[9]	7.6	7.5	6.7	7.5
Av. size ribeye, vis. est.[10]	4.6	4.2	4.5	4.6
Av. size ribeye, sq. in.	9.8	9.8	10.0	9.6
Av. degree of firmness[11]	4.6	4.5	3.9	4.4

3. Based on silage $7 per ton, prairie hay $14 per ton, grain $2 per cwt., soybean oil meal $70 per ton, ammoniated molasses $45 per ton, mineral mixture $50 per ton and salt $20 per ton.

4. Sorghum silage fed only first 25 days.

5. Prairie hay fed last 109 days.

6. Based on top choice 15, av. choice 14, low choice 13, top good 12, av. good 11, low good 10.

7. Based on thick 2, moderate 3, modest 4, slightly thin 5.

8. Based on uniform 2, moderate 3, modest 4, slightly uneven 5.

9. Based on slightly abundant 4, moderate 5, modest 6, small amount 7, slight amount 8.

10. Based on large 2, moderately large 3, modestly large 4, slightly small 5.

11. Based on firm 2, moderately firm 3, modestly firm 4, slightly firm 5.

The Value of Aureomycin[1] for Steer Calves on Winter Bluestem Pasture and on Fattening Rations, 1957-58. Project 253-1.

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

Aureomycin at the rate of 70 mgs. per head daily was fed to steer calves being wintered on bluestem pasture. At the close of the wintering phase the steers were continued on summer pasture but without supplemental feed until late July, when grain was fed in addition to grass.

The steers were moved to drylot August 7 and Aureomycin was again added to the ration at the rate of 70 mgs. per head daily. In addition to the group fed Aureomycin, another group of steers received identical treatment without Aureomycin being added to their ration. Each steer in both lots received a 24-mg. stilbestrol implant August 9, 1958.

The good-to-choice grade Hereford steer calves used in the test came from near Clovis, N.M., and were assigned to treatments on the basis of weight.

Observations

Aureomycin had no apparent effect during the wintering period but increased gains .61 pound per head daily and improved feed efficiency considerably during the fattening period. The steers fed Aureomycin had a dressing percentage 1.2 percent lower than the control lot, which is difficult to explain.

Increased gains on fattening rations previously reported from feeding Aureomycin usually have been considerably less than obtained in this trial.

1. The Aureomycin was furnished by the American Cyanamid Co., Pearl River, N.Y.

Table 7

The value of Aureomycin for steer calves on winter bluestem pasture and on fattening rations.

Treatment	No Aureomycin	Aureomycin[1]
Wintering—December 27, 1957, to April 19, 1958—113 days.		
Number of steers	9	10
Initial wt. per steer, lbs.	529	530
Gain per steer, lbs.	79	76
Daily gain per steer, lbs.	.70	.67
Daily ration per steer:		
Soybean meal	1.0	1.0
Sorghum grain	4.0	4.0
Mineral and salt, free choice[2]		
Bluestem pasture, free choice		
Aureomycin, 70 mgs. per steer daily[1]		Yes
Feed cost per steer[3]	$15.33	16.67
Grazing—April 19, 1958, to August 7, 1958—110 days.		
Initial wt. per steer, lbs.	608	606
Gain per steer, lbs.	217	226
Daily gain per steer, lbs.	1.97	2.05
Fattening—August 7, 1958, to November 14, 1958—99 days.		
Initial wt. per steer, lbs.	825	832
Gain per steer, lbs.	307	367
Daily gain per steer, lbs.	3.10	3.71
Daily ration per steer, lbs.:		
Sorghum grain, self-fed	21.6	22.3
Soybean meal	1.0	1.0
Alfalfa hay	5.4	5.4
Aureomycin, 70 mgs. per head daily		Yes
Stilbestrol implant, 24 mgs. to each steer	Yes	Yes
Salt, free choice		

1. Aureomycin was fed as Aurofac 2A in amounts to furnish 70 mgs. of Aureomycin per head daily.

2. The mineral fed free choice was equal parts by weight of bonemeal and salt; salt was also fed free choice.

Table 7 (Continued)

Feed per cwt. gain, lbs.:		
Sorghum grain	696	601
Soybean meal	32	27
Alfalfa hay	172	145
Feed cost per steer[3]	$50.31	52.72
Feed cost per cwt. gain	$16.39	14.37
Summary—December 27, 1957, to November 14, 1958—322 days.		
Final wt. per steer, lbs.	1132	1199
Gain per steer, lbs.	603	669
Daily gain per steer, lbs.	1.87	2.08
Feed cost per steer[3]	$81.64	85.39
Feed cost per cwt. gain	$13.54	12.76
Sale price per cwt., live weight, based on carcass value[4]	$26.69	26.45
Dressing %	59.4	58.2
Av. carcass grade[5]	16.4	17.0
Av. marbling score[6]	8.3	7.8

3. Feed prices may be found inside back cover.

4. Carcasses were evaluated per cwt. as follows: Choice, $46.50; good, $45.50; standard, $43.58.

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

6. The description of the marbling score was as follows: Small amount, 7; slight amount, 8; traces, 9.

Wintering Heifers on Bluestem Pasture; Molasses vs. Sorghum Grain, Soybean Meal vs. Soybean Meal Plus Beef Tallow, 1957-1958. Project 253-2.

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

In this experiment two feeds were evaluated as possibilities for economically increasing gains on winter pasture. Molasses was self-fed to heifer calves in one pasture and compared with sorghum grain hand fed to heifer calves in another pasture. The dry matter intake was maintained at about the same level by varying the sorghum grain intake to equal molasses consumption. Soybean meal was fed as a source of protein to both lots.

A third lot was fed soybean meal with beef tallow added to study beef tallow as a source of energy and to observe its effect on palatability. The beef tallow varied in percentage fed, but the soybean meal fed this lot contained an average of about 10% tallow. Inedible stabilized bleachable fancy tallow was fed.

Good to choice Hereford heifers used in the test came from near Clovis, N.M., and were assigned to their experimental treatment on the basis of weight. The lots were fed as follows:

Lot 1. One pound of soybean meal per head daily and sorghum grain to equal the dry matter intake of molasses by lot 2.

Lot 2. One pound of soybean meal per head daily and cane molasses self-fed.

Lot 3. One pound of soybean meal per head daily with added beef tallow (about 10%) and molasses self-fed.

Plenty of old grass was available in all pastures, about 6 acres per head. A mineral mixture of 2 parts bonemeal and 1 part salt by weight and salt alone were offered free choice.

The winter feeding period was discontinued April 19 but the heifers were grazed with no supplemental feed until July 19.

Observations

Molasses was equal to sorghum grain as a source of nutrients, primarily energy, on winter pasture. An attempt was made to keep the dry matter intake of the lots about the same by regulating the sorghum grain consumption in keeping with molasses intake; the molasses was self-fed.

Due to the larger consumption of molasses on an "as fed basis" the cost of production was somewhat higher for the molasses lots.

The tallow fed to lot 3 was unpalatable. The first soybean meal fed carried 10% inedible bleachable fancy tallow; it was refused by the animals. They were then gradually introduced to the tallow by mixing only minute quantities with the soybean meal. The last 60 days the soybean meal carried 17% tallow. There appeared to be a great deal of individual variation in regard to acceptance of the tallow: one heifer was never observed eating the supplement, whereas a few ate it readily after a few days.

The tallow did not improve the performance of the heifers.

Table 8

Wintering heifers on bluestem pasture; molasses vs. sorghum grain, soybean meal vs. soybean meal, plus tallow.

Treatment	Sorghum grain and soybean meal	Molasses and soybean meal	Molasses and soybean meal plus tallow
Pasture number	1	2	3
Number of heifers per pasture	10	10	9
Initial wt. per heifer, lbs.	523	524	530
Final wt. per heifer	589	591	584
Gain per heifer	66	67	54
Daily gain per heifer	0.52	0.53	0.43
Daily ration per heifer:			
Soybean meal	1.0	1.0	
Soybean meal, 10% tallow			1.0
Sorghum grain	3.4		
Molasses, self-fed		5.1	4.2
Bonemeal and salt mixture		Free choice	
Salt		Free choice	
Bluestem pasture		Free choice	
Feed cost per heifer[1]	15.31	19.83	17.47
Grazing—April 19, 1958, to July 19, 1958—91 days.			
Initial wt. per heifer, lbs.	589	591	584
Final wt. per heifer	761	753	767
Gain per heifer	172	162	183
Daily gain per heifer	1.89	1.78	2.01
Grazing cost per heifer	$16.00	16.00	16.00
Summary—December 13, 1957, to July 19, 1958—218 days.			
Initial wt. per heifer, lbs.	523	524	530
Final wt. per heifer	761	753	767
Gain per heifer	238	229	237
Daily gain per heifer	1.09	1.05	1.09
Feed cost per heifer[1]	$31.31	35.83	33.47
Feed cost per 100 lbs. gain[1]	$13.16	15.65	14.12

1. Feed prices may be found inside the back cover.

The Value of Supplementary Trace Minerals[1] and Trace Minerals Plus Bonemeal in a Fattening Ration, 1958. Project 253-2.

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

This is the fifth experiment in this series conducted to determine the value of added trace minerals in a typical cattle-fattening ration. The four previous experiments are reported in Kansas Agricultural Experiment Station Circulars 279, 308, 335, and 358. No response has been obtained when trace minerals were added to high roughage rations of sorghum silage, sorghum grain and a protein concentrate, or to a fatten-

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

ing ration of sorghum grain, prairie hay, and a protein concentrate. Improved performance has been obtained when trace minerals were added to fattening rations of corn, prairie hay, and a protein concentrate. Ground limestone has been fed in all the fattening trials to furnish adequate calcium.

Experimental Procedure

Forty-nine head of good to choice Hereford heifers were divided on the basis of previous treatment and weight into 5 lots, 9 in 1 lot and 10 in each of the other 4 lots. The heifers were purchased as calves in the fall of 1957 near Clovis, N.M., and had been wintered and summer grazed on bluestem pastures near Manhattan prior to the experiment. They were fed corn on pasture for about 10 days before being moved to dry lot and starting on experiment.

Lots 1 and 2 were fed the control ration of corn, protein supplement, prairie hay, and ground limestone, lots 3, 4, and 5 received added trace minerals and lot 5 received bonemeal instead of ground limestone to observe the value of added phosphorus.

The corn was self-fed and prairie hay was fed daily in quantities readily eaten. Soybean meal was fed once daily with the daily allowance of ground limestone, or bonemeal in the case of lot 5, mixed with it.

The trace minerals were fed as a trace mineral premix and were 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 rations of the heifers in lots 3 and 4 increased the gain an average of 0.33 pound per head daily, with only a slight improvement in efficiency of gain over lots 1 and 2. The carcasses in general were about the same; however, carcasses from lot 3 (a trace mineral lot) graded slightly lower.

Additional phosphorus, about 9 grams per head daily (lot 5), failed to improve performance.

The improvement in gain, noted in this test where trace minerals were fed, was slightly lower than the average of 0.47 pound per head daily achieved in two previous trials.

Table 9

The value of supplementary trace minerals and trace minerals plus bonemeal in a fattening ration.

August 7, 1958, to November 10, 1958—95 days.

Lot number	1	2	3	4	5
Number of heifers per lot	10	10	9[1]	10	9
Management	No supplementary trace minerals	No supplementary trace minerals	Trace minerals added[2]	Trace minerals added[2]	Trace minerals[2] and bonemeal added
Initial wt. per heifer, lbs.	778	780	775	792	789
Final wt. per heifer, lbs.	1021	1034	1058	1069	1075
Gain per heifer, lbs.	243	254	283	277	286
Daily gain per heifer, lbs.	2.56	2.67	2.98	2.92	3.01
Daily ration per heifer, lbs.:					
Ground corn, self-fed	17.3	18.0	18.3	19.2	19.3
Soybean meal	1.5	1.5	1.5	1.5	1.5
Prairie hay	3.7	3.8	3.9	3.7	3.9
Salt	.05	.03	.04	.05	.04
Ground limestone	0.10	0.10	0.10	0.10	
Bonemeal					0.17
Trace minerals[2]	No	No	Yes	Yes	Yes

Table 9 (Continued)

Feed per cwt. gain, lbs.:					
Corn	677	672	616	657	642
Soybean meal	59	56	50	51	50
Prairie hay	144	141	130	128	130
Cost of feed per cwt. gain[3]	$18.60	18.38	16.81	17.78	17.71
Total feed cost	$45.20	46.68	47.58	49.26	50.65
Selling price per cwt.[4]	$24.26	24.29	23.96	24.76	24.55
Dressing percent	58.6	58.3	58.2	59.6	60.0
Carcass grades, USDA:					
Low choice	1	3		2	2
High good	2	5	4	5	5
Av. good	3				1
Low good	3	2	3	3	
High standard	1		2		1
Av. thickness of finish, score[5]	3.9	3.8	3.8	4.1	3.7
Av. degree of marbling, score[6]	7.7	6.9	7.4	7.2	7.0
Av. size of rib-eye, score[7]	4.3	4.2	4.2	4.5	4.1

1. One heifer died, cause unknown.

2. These quantities were fed in mg. per head daily: cobalt, 1.25; copper, 3.65; iodine, 1.97; iron, 46.13; manganese, 56.3; and zinc, 3.42.

3. See table on inside back cover page of bulletin for feed prices.

4. Selling price was computed on the basis of carcass grade, weight, and carcass price: choice, $42.50 cwt.; high and av. good, $41.50; low good, $41; and standard, $40.50.

5. Scores for thickness of finish: moderate, 3; modest, 4.

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

7. Scores for size of rib-eye: modestly large, 4; slightly small, 5.

Feeding Two Levels of Alfalfa Hay to Heifer Calves on Winter Bluestem Pasture, 1957-1958, and a Three-Year Summary, 1955-1958. Project 253-2.

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

This experiment was designed to collect data in regard to the optimum level of alfalfa hay feeding for calves wintered on bluestem pasture. One group of heifers was fed twice as much alfalfa hay as another, but the supplemental total digestible nutrient intake was maintained at about the same level by feeding grain to heifers on the lower level of alfalfa hay. Two previous tests are reported in Circulars 349 and 358.

Experimental Procedure

In the third experiment reported here, 20 heifers, originating near Clovis, N.M., were assigned to the following experimental treatments on the basis of weight:

Pasture 8. Fed 4 pounds of alfalfa hay and 2.6 pounds of ground corn per head daily.

Pasture 13. Fed 8 pounds of alfalfa hay per head daily.

The 4 pounds of alfalfa and 2.6 pounds of corn fed to heifers in pasture 8 furnished approximately the same amount of total digestible nutrients as the 8 pounds of alfalfa hay fed to the heifers in pasture 13.

Sufficient old grass was available in both pastures, and the heifers had free access to salt and a bonemeal and salt mixture of equal parts by weight.

After the wintering period, the heifers were grazed without supplemental feed until July 19.

Observations, 1957-1958

Apparently 4 pounds of alfalfa hay furnished adequate protein and other nutrients that are supplied by alfalfa hay since the heifers receiving this treatment, with supplementary total digestible nutrient intake equalized, gained 0.17 pound more per head daily than heifers receiving 8 pounds of alfalfa hay per head daily.

For the winter and summer periods combined, heifers fed 4 pounds of alfalfa hay and 2.6 pounds of corn per head daily gained about 10 percent more than heifers fed 8 pounds of alfalfa hay.

The economy of the two rations would depend on the relative cost of hay and grain. With current prices, the all-alfalfa hay ration would be fully as efficient a ration as the alfalfa and grain combined.

This test demonstrates how alfalfa hay feeding on winter pasture can be reduced from 8 to 4 pounds per head daily with satisfactory results, if the difference in hay intake is made up by feeding about 2½ pounds of corn.

Table 10

Two levels of alfalfa hay for wintering heifer calves on bluestem pasture.

Pasture number	13	8
Wintering—December 14, 1957, to April 19, 1958—127 days.		
Number of heifers	10	10
Initial wt. per heifer, lbs.	525	518
Gain per heifer	73	94
Daily gain per heifer	0.57	0.74
Daily ration per heifer, lbs.:		
Alfalfa hay	8.0	4.0
Ground shelled corn		2.6
Bluestem pasture	Free choice	
Salt	Free choice	
Bonemeal and salt	Free choice	
Feed cost per heifer[1]	8.13	11.65
Grazing—April 19, 1958, to July 19, 1958—91 days.		
Initial wt. per heifer	598	612
Gain per heifer	164	171
Daily gain per heifer	1.80	1.88
Feed cost per heifer	$16.00	16.00
Summary—December 14, 1957, to July 19, 1958—218 days.		
Initial wt. per heifer	525	518
Final wt. per heifer	762	783
Gain per heifer	237	265
Daily gain per heifer	1.09	1.22
Feed cost per heifer[1]	$24.13	27.65
Feed cost per cwt. gain[1]	$10.18	10.43

1. Feed prices may be found on inside back cover.

Three-Year Summary, 1955-58

For the three-year summary (Table 11), the 3.7 pounds of alfalfa hay and 2.2 pounds of corn fed per head daily to the heifers in pasture 2 produced .20 pound more gain per head daily during the winter and 9 percent more gain for the winter and summer combined than the 7.3 pounds of alfalfa hay fed per head daily to pasture 1. This trend has been the same in each of the three years tested.

Apparently 3 to 4 pounds of alfalfa hay furnishes adequate protein and other nutrients supplied by alfalfa hay, since this lot, when fed 2-2.5 pounds of corn per head daily to equalize total digestible nutrient intake, gained as much or more than heifers fed 7 to 8 pounds of alfalfa hay per head daily.

A comparison of costs of production with the two rations would depend on the relative cost of hay and grain. When alfalfa hay is unavailable or high in price, this test demonstrates a low level that can be fed with satisfactory results.

Table 11

Three-Year Summary

A comparison of two levels of alfalfa hay for wintering heifer calves on bluestem pasture, 1955-1958.

Pasture number	1	2
Wintering—December to April—126.7 days (average).		
Total number of heifers in test	31	30
Initial wt. per heifer, lbs.	492	488
Gain per heifer	43	68
Daily gain per heifer	0.34	0.54
Daily ration per heifer, lbs.:		
Alfalfa hay	7.3	3.7
Ground shelled corn		2.2
Bluestem pasture	Free choice	
Salt	Free choice	
Bonemeal and salt mixture	Free choice	
Feed cost per heifer[1]	$11.75	14.22
Grazing—107.7 days.		
Initial wt. per heifer	535	556
Gain per heifer	196	194
Daily gain per heifer	1.82	1.80
Feed cost per heifer	$16.00	16.00
Summary—234.4 days.		
Initial wt. per heifer	492	488
Final wt. per heifer	731	750
Gain per heifer	239	262
Daily gain per heifer	1.02	1.12
Feed cost per heifer[1]	$27.75	30.22
Feed cost per cwt. gain[1]	$11.61	11.53

1. Feed prices: Alfalfa hay, $20 per ton; corn, $2.50 per cwt.; pasture, $16 for summer and $0.50 per head monthly for winter use.

Different Methods of Managing Bluestem Pastures, 1958. Projects 253-3 and 253-5.

E. F. Smith, K. L. Anderson, B. A. Koch, F. W. Boren, and G. L. Walker

This experiment is to determine effects of different stocking rates, deferred grazing, and pasture burning on cattle gains, 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 nine years of the study is included.

Experimental Procedure

Two-year-old Hereford steers with an average USDA feeder grade of High Good were used to stock the pastures. They had been purchased as calves from near Melrose, N.M., and had been used in this study as yearlings during the summer of 1957. During the winter of 1957-58 they were wintered on bluestem pasture and supplemented with about 2 pounds of soybean pellets per head daily until mid-January and were then moved to drylot and fed prairie hay with about 4 pounds of alfalfa hay per head daily. This ration was continued until May 1, 1958.

The method of management of each pasture was:

Pasture 1. Normal stocking rate, 4 acres per head.
Pasture 2. Overstocked, 3 acres per head.
Pasture 3. Understocked, 6 acres per head.
Pastures 4, 5, 6. Deferred grazing, 4 acres per head.

All steers in the deferred group were held in pastures 4 and 5 until June 16, then turned into deferred pasture 6 until August 16. From August 16 until September 2 the steers were in all three pastures. Sep-

tember 2 they were again put into pastures 4 and 5 until the close of the test.

Pasture 9. Burned March 21, 1958, normal rate of stocking.
Pasture 10. Burned April 11, 1958, normal rate of stocking.
Pasture 11. Burned May 1, 1958, normal rate of stocking.

Observations

The results are presented in Tables 12 and 13. An excellent top growth remained after the grazing season on all pastures except pasture 2 (overstocked) and pasture 9 (early spring burned). Pasture 6, a deferred pasture, also had much of its top growth removed; the 45 steers on this treatment remained on this 60-acre pasture 60 days.

Normal stocking, overstocking, understocking, and deferred grazing all produced about the same gain per head in 1958; but mid- and late-spring burning increased cattle gains in 1958 as they have in nearly every year tested.

Moisture was fairly abundant throughout the growing season of 1958 and top growth was, therefore, greater than in any recent year. This made the heavily stocked pasture more nearly moderately utilized than in the past. That, coupled with the fact that cattle were sold September 20, nearly six weeks before the normal close of the growing season, failed to give this pasture heavy use in 1958. This prevented the cattle from experiencing effects on weight gains of overstocking and it seems to have prevented the grasses from being abused by the close grazing.

On the burned pastures, while it is obvious that early-spring burning (March 20) is damaging the cover and fairly obvious that mid-spring burning (April 10) is also harmful, it is difficult as yet to show any serious, permanent damage from the late spring burning (May 1). It admittedly is too early in this trial to make such a statement without qualifications, but it is known that burning removes mulch. This always results in increased runoff and evaporation and in a reduced rate of water intake by the soil. Reduction in intake rate is known to continue at least until fall and may be a year-'round phenomenon. This is certain to affect production of top growth, but it is parrly obscured in years like 1958 when rains came rather frequently throughout the growing season. The past season was not a good one to evaluate the results of these tests.

Table 12

A comparison of different methods of managing Kansas bluestem pastures.

May 1, 1958, to September 20, 1958—142 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
No. steers per pasture	15	20	10	45	11	11	11
Acres in pasture	60	60	60	3-60[1]	44	44	44
No. acres per head	4	3	6	4	4	4	4
Av. initial wt., lbs.	738	738	739	743	745	746	747
Av. final wt., lbs.	946	945	946	941	967	1016	1000
Av. gain per steer, lbs.	208	207	207	198	222	270	253
Av. daily gain, lbs.	1.46	1.45	1.45	1.39	1.55	1.90	1.78
Av. gain per acre, lbs.	52	69	35	50	56	68	63

1. Three 60-acre pastures.

Table 13

Yearly account of cattle gains under different methods of grazing pastures; nine-year summary, 1950-1958. 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	222	270	253
Average	233	217	230	202	240	261	262

Stilbestrol Implants[1] for Steer Calves on a Wintering, Grazing, and Fattening Program; the Value of a Tranquilizing Agent[1] During the Wintering and Fattening Periods, 1957-1958. Project 253-6.

E. F. Smith, B. A. Koch, F. W. Boren, and G. L. Walker

Good to choice quality Hereford steer calves originating near Clovis, N.M., were used in the experiment and assigned to treatments on the basis of weight. All of the lots received the same basic ration during the wintering period from December 5, 1957, to April 24, 1958. They were grazed on bluestem pasture from April 24 to August 7 and were started on grain on grass prior to being moved to drylot. All lots were fed the same feeds during the fattening period from August 7, 1958, to November 14, 1958. The grain was self-fed.

The experimental treatment was as follows:

Lot 1. Control group of 10 steer calves, implanted with 24 mg. of stilbestrol August 9, 1958.

Lot 2. Eighteen steer calves, all implanted with 24 mg. of stilbestrol December 10, 1957, 6 were reimplanted with 24 mg. of stilbestrol April 30, 1958, and 6 more August 9, 1958, leaving only 6 with the original fall implant. See Table 14 for gains of different implant groups.

Lot 3. Eight steer calves that received 2.5 mg. of Tran-Q per head daily during the wintering and fattening periods. They were implanted with 24 mg. of stilbestrol August 9, 1958.

Wintered with each lot, but not included in this report, were 10 steer calves that remained in drylot for fattening studies when the steers listed here were removed to pasture.

Observations

A 24-mg. stilbestrol implant increased winter gains .20 pound per head daily, with some increase in efficiency; compare lots 1 and 2 in Table 14. In Table 15, based on a rather limited number of animals, it appears that another implant in April, following a previous fall implant, is necessary for increased grass gains. Calves implanted in the fall of 1957 also responded to an August, 1958, implant for an increased fattening gain. Steers implanted only at the start of the fattening period had slightly higher grading carcasses, but the difference is so small it is difficult to evaluate.

The tranquilizer had no apparent effect during the winter period. However, for some unknown reason grass gains were larger for this lot. The tranquilizer increased fattening gains .53 pound per steer daily, with no increase in feed efficiency due to consumption of more grain. The increased gains noted here possibly could be attributed to some other factor, since in another test reported in this circular very little increase in gain was noted where the same tranquilizer was fed.

1. The stilbestrol implants and Tran-Q (a brand name for Hydroxyzine, a tranquilizing agent) were furnished by Charles Pfizer and Co., Inc., Terre Haute, Ind.

Table 14

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

Phase 1—Wintering—December 5, 1957, to April 24, 1958—140 days.			
Lot number	1	2	3
Number of steers	10	18	8
Treatment	Control	24 mg. stilbestrol implant[2]	Tran-Q[1]
Initial wt. per steer, lbs.	551	551	562
Gain per steer	183	212	191
Daily gain per steer	1.31	1.51	1.36
Daily ration per steer, lbs.:			
Sorghum grain	4.0	4.0	4.0
Soybean meal	1.0	1.0	1.0
Sorghum silage	13.5	14.1	12.7
Prairie hay	7.1	7.1	8.1
Tranquilizer (Tran-Q)[1]	No	No	Yes
Stilbestrol implants, 24 mg.[2]	No	Yes	No
Salt and mineral, free choice[3]			
Feed per cwt. gain, lbs.:			
Sorghum grain	306	264	293
Soybean meal	77	66	73
Sorghum silage	1033	931	931
Prairie hay	543	469	594
Feed cost per steer[4]	$29.47	29.76	30.05
Feed cost per cwt. gain	$16.10	14.04	15.73
Phase 2—Grazing—April 24, 1958, to August 7, 1958—105 days.			
Initial wt. per steer, lbs.	734	763	753
Gain per steer	89	98	117
Daily gain per steer	.85	.93	1.11
Grazing cost per steer	$16.00	16.00	16.00
Phase 3—Fattening—August 7, 1958, to November 14, 1958—99 days.			
Initial wt. per steer, lbs.	823	861	870
Gain per steer	297	294	349
Daily gain per steer	3.00	2.97	3.53
Daily ration per steer, lbs.:			
Sorghum grain, self-fed	20.0	22.5	23.5
Soybean meal	1.0	1.0	1.0
Alfalfa hay	5.2	5.2	5.4
Implanted with stilbestrol, 24 mg.	Yes	Yes[2]	Yes
Tranquilizer	No	No	Yes
Salt, free-choice			
Feed per cwt. gain, lbs.:			
Sorghum grain	667	758	668
Soybean meal	33	34	28
Alfalfa hay	174	176	153
Feed cost per steer, this phase[4]	$47.43	51.51	53.68
Feed cost per cwt. gain	$15.97	17.52	15.38
Summary of Phases 1, 2 and 3—December 5, 1957, to November 14, 1958—344 days.			
Final wt. per steer, lbs.	1120	1155	1219
Gain per steer, all phases	569	604	657

1. Tran-Q is the brand name of a tranquilizer (Hydroxyzine) supplied by Chas. Pfizer & Co., Inc., Terre Haute, Ind. It was fed at the level of 2½ mg. per head daily during the wintering and fattening periods.

2. All steers were implanted with 24 mg. stilbestrol December, 1957; 6 were re-implanted in April with 24 mg., and 6 more in August with 24 mg. See table for gains by phases of each implanted group.

3. Mineral was equal parts bonemeal and salt by weight and salt by itself, all free choice.

4. Feed prices may be found inside back cover.

Table 14 (Continued)

Daily gain per steer	1.65	1.76	1.91
Feed cost per steer[1]	$92.90	97.27	99.73
Feed cost per cwt. gain	$16.33	16.10	15.18
Sale price per cwt., live weight, based on carcass value[5]	$27.40	26.93	27.13
Dressing percent	60.2	59.4	59.6
Carcass grade:			
Average choice	1		1
Low choice	1	1	1
High good	2	2	2
Average good	3	6	1
Low good	3	7	2
High standard	1	2	1
Average grade[6]	17.1	16.6	17.4
Average marbling score[7]	7.2	7.6	7.5

5. Sale price per cwt. was based on the following carcass values per cwt.: Choice, $46.50; Good, $45.50; Standard, $43.50.

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

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

Table 15

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. '57 to Apr. '58, 140 days	Summer gain Apr. '58 to Aug. '58, 105 days	Fattening gain Aug. '58 to Nov. '58, 99 days	Total gain Dec. '57 to Nov. '58, 344 days	Average carcass grade[1]
		Pounds per head				
Implanted in December, 1957, with 24 mg.	6	228	83	282	593	16.7[1]
Implanted in December, 1957, and April, 1958, with 24 mg. each time	6	214	110	276	600	16.8[1]
Implanted in December, 1957, and August, 1958, with 24 mg. each time	6	199	98	321	618	16.3[1]
Implanted in August, 1958, with 24 mg.	10	183	89	297	569	17.1[1]

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

The Value of Stilbestrol Implants,[1] Stilbestrol Implants Plus Aureomycin,[2] and Shelter for Wintering Steer Calves, 1958-1959. Project 253-6.

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

Forty-four good to choice Hereford steer calves from near Paducah, Texas, were assigned to four treatments on the basis of weight. All lots were fed identical high roughage rations. They received per head daily: 4.7 pounds of sorghum grain, 0.5 pound of soybean meal, 0.1 pound of bonemeal, and 3 pounds of alfalfa hay. Sorghum silage was fed according to appetite, and salt was offered free choice.

1. The stilbestrol implants were furnished by Charles Pfizer and Co., Inc., Terre Haute, Ind.

2. The Aureomycin was furnished by the American Cyanamid Co., Pearl River, N.Y.

The experimental treatments were as follows:

Lot 1. Control.

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

Lot 3. Each steer implanted with 24 mgs. of stilbestrol in the right ear plus 70 mgs. of Aureomycin per steer daily added to the soybean meal.

Lot 4. Access to a shedlike metal shelter closed to the north and above but open to the south, east, and west.

The steers were fed in dirt lots with wooden fences, and a low solid wooden fence on the north served as a windbreak for each lot.

The animals in this experiment will be grazed and fattened during the summer and fall of 1959; some will be reimplanted with stilbestrol to collect more information on the use of stilbestrol implants in a wintering, grazing, and fattening program.

Observations

A 24-mg. stilbestrol implant increased steer gains 0.21 pound per head daily, with a small improvement in efficiency. Increased gains have been obtained in previous trials at this station of about the same magnitude. No readily apparent change in appearance of the animals was noted; however, as the animals continue on test some differences may develop. Slight to severe changes in the tailhead region have been noted in previous trials, depending on the level of implant and level of nutrition.

Aureomycin failed to improve performance when fed to stilbestrol-implanted steers. Small but consistent gain increases have been noted in other trials when Aureomycin was fed to nonstilbestrol-implanted steers.

Shelter proved to be of little value in this experiment.

Table 16

The value of stilbestrol implants, stilbestrol implants plus Aureomycin, and shelter for wintering steer calves.

December 1, 1958, to March 30, 1959—120 days.

Treatment	Control	Stilbestrol implant	Stilbestrol implant and Aureomycin	Shelter
Lot number	1	2	3	4
Number of animals	10	12	12	10
Initial wt. per steer, lbs.	488	494	495	489
Final wt. per steer, lbs.	697	728	725	707
Gain per steer	209	234	230	218
Daily gain per steer	1.74	1.95	1.92	1.82
Daily ration per steer, lbs.:				
Soybean meal	0.5	0.5	0.5	0.5
Sorghum grain	4.7	4.7	4.7	4.7
Bonemeal	0.1	0.1	0.1	0.1
Alfalfa hay	3.0	3.0	3.0	3.0
Sorghum silage	23.3	24.4	24.3	23.2
Salt, free choice				
Stilbestrol implant, 24 mgs.		Yes	Yes	
Aureomycin, 70 mgs. per head daily			Yes	
Feed per cwt. gain, lbs.:				
Soybean meal	29	26	26	28
Sorghum grain	271	242	246	260
Alfalfa hay	172	154	157	165
Sorghum silage	1337	1253	1267	1278
Feed cost per cwt. gain[1]	$11.48	10.44	11.21	10.99

1. Feed prices used are on the inside back cover.

Winter Management for Steer Calves on a Wintering, Grazing, and Fattening Program, 1957-1958. Project 253-6.

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

Previous tests were reported in Circulars 349 and 358 from this station. The objective of this experiment is to determine if winter bluestem pasture can be supplemented in such a manner that calves wintered on it will compare favorably in yearly performance with steer calves wintered on good-quality roughage. It has been noted in the first two tests that, under the costs assigned, the steers wintered on high-quality roughage in drylot would have to grade higher and sell for more per cwt. to make as great a return as those wintered on dry grass.

Experimental Procedure

Twenty head of good to choice Hereford steer calves from near Clovis, N.M., were divided on the basis of weight into two lots of 10 each. The treatment assigned to each lot was as follows:

Lot 22. Wintered in drylot on sorghum silage, 4 pounds of ground sorghum grain, and 1 pound of soybean meal per head daily; grazed on bluestem pasture from April 24 to August 7; fattened in drylot from August 7 to November 14, 1958.

Lot 12. Wintered on bluestem pasture, 4 pounds of ground sorghum grain, and 1 pound of soybean meal per head daily, with the remainder of their treatment identical to that of lot 22.

Observations

The steers fed high-quality roughage in drylot gained 119 pounds more per head during the winter period than the steers wintered on pasture, but gained 112 pounds less during the summer pasture period, which made the winter and summer gain combined about the same for both lots.

The gains were approximately the same during the fattening period, and only small differences were observed in efficiency of gain. The steers wintered on pasture consumed slightly more grain, with little increase in gain, which increased slightly the quantity of grain they took per cwt. gain.

Steers in lot 12, wintered on dry grass, gained 13 pounds more per head, had a $3 lower feed cost per cwt. gain, and returned $8.97 more per head. The steers wintered on good-quality roughage in drylot sold for $0.78 more per cwt. based on carcass value, dressed 0.8 percent more, and graded one third of a grade higher, producing slightly superior carcasses.

Table 17

Winter management for steer calves on a wintering, grazing, and fattening program, 1957-1958.

Phase 1—Wintering—December 5, 1957, to April 24, 1958—140 days.		
Lot number	22	12
No. steers per lot	10	10
Place of wintering	Drylot	Bluestem pasture
Initial wt. per steer, lbs.	551	550
Final wt. per steer, lbs.	733	613
Gain per steer, lbs.	182	63
Daily gain per steer, lbs.	1.3	.45
Daily ration per steer, lbs.:		
Ground sorghum grain	4.0	4.0
Soybean oil meal	1.0	1.0
Sorghum silage	11.9	
Prairie hay	8.4	
Bluestem pasture		Free choice
Salt	Free choice	Free choice
Feed cost per steer[1]	$39.75	20.05
Feed cost per cwt. gain[1]	21.84	31.82

Table 17 (Continued)

Phase 2—Grazing—April 24, 1958, to August 7, 1958—106 days.		
Initial wt. per steer, lbs.	733	613
Final wt. per steer, lbs.	823	825[2]
Gain per steer, lbs.	90	212
Daily gain per steer, lbs.	.85	2.0
Feed cost per steer	$16.00	16.00
Phase 3—Full feeding—August 7, 1958, to November 14, 1958—99 days.		
No. steers per lot	10	9
Initial wt. per steer, lbs.	823	825
Final wt. per steer, lbs.	1120	1132
Gain per steer, lbs.	297	307
Daily gain per steer, lbs.	3.0	3.1
Daily ration per steer, lbs.:		
Ground sorghum grain, self-fed	19.8	22.0
Soybean oil meal	1.0	1.0
Alfalfa hay	5.2	5.2
Salt	Free choice	Free choice
Feed per cwt. gain, lbs.:		
Ground sorghum grain	661	704
Soybean oil meal	33.5	32.4
Alfalfa hay	174	169
Feed cost this phase[1]	$59.06	63.98
Feed cost per cwt. gain[1]	19.89	20.84
Summary of Phases 1, 2, and 3—December 5, 1957, to November 14, 1958—345 days.		
Lot number	22	12
Total gain per steer, lbs.	569	582
Daily gain per steer, lbs.	1.65	1.69
Total feed cost per steer[1]	$114.81	100.03
Feed cost per cwt. gain	20.18	17.18
Initial steer cost at $25 per cwt. plus feed cost	252.56	237.53
Carcass sale price per cwt. based on carcass value[4]	44.88	44.10
Sale price per steer[4]	302.40	296.34
Return per steer	49.84	58.81
Dressing %[5]	62.0	61.2
Carcass grade, USDA:[6]		
Av. choice	1	
Low choice	1	1
High good	2	
Av. good	3	4
Low good	2	1
High standard	1	3
Av. USDA grade[6]	17.3	16.4
Av. marbling score[7]	7.4	8.3
Av. carcass conformation grade[8]	19.3	19.4
Av. before ribbing grade[8]	17.3	17.0

1. Feed prices: Sorghum grain, $2.50 per cwt.; soybean oil meal, $70 per ton; sorghum silage, $8 per ton; alfalfa hay, $25 per ton; salt, $0.75 per cwt.; winter pasture, $0.50 per head per month.

2. One steer removed during the grazing season because of an injury.

3. Based on carcass weights and grade with 600-700 pound carcass U.S. choice, 46c; U.S. good, 44½c; low U.S. good, 44c; and U.S. standard, 43c per pound. Five hundred to 600 pound U.S. choice, 47c; U.S. good, 46½c; low U.S. good, 46c; and U.S. standard, 44c per pound.

4. Based on carcass values as stated above.

5. Dressing percentage was determined by shrinking the Manhattan final live weight 3 percent and dividing hot carcass weight by that sum.

6. Average grade determined as follows: Average choice, 20; low choice, 19; high good, 18; average good, 17; low good, 16; high standard, 15.

7. Visual marbling score determined as follows: Small amount, 7; slight amount, 8; trace, 9.

8. Carcass conformation grade and before-ribbing grade determined as in footnote 6 above.

Nutritive Value of Forages as Affected by Soil and Climatic Differences; Value of Trace Minerals for Calves on Sandstone Pasture. Project 430.

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

Data presented in Kansas Circular 358 seemed to indicate that beef cattle consuming forage grown on native limestone pasture gained somewhat more weight than those consuming forage grown on native sandstone pasture. Under the conditions of that study it was impossible to determine if any one factor was responsible for the apparent difference in weight gains.

The current study was designed to determine whether or not trace mineral supplementation is of any value when beef calves are grazing on native pasture growing on sandstone soil. Available analyses show little or no differences in trace mineral content of various Kansas soils. Likewise, data available do not indicate that Kansas feeds are deficient in trace mineral content. However, trace mineral supplementation is being promoted quite widely, and under practical conditions there is evidence that trace mineral supplementation may have been beneficial in certain cases.

Experimental Procedure

Twenty-four Hereford steer calves were turned onto native pasture in Woodson County, Kans., May 9, 1958. The calves were the lighter weight calves from a larger group obtained near Clovis, N.M. They had been wintered together in drylot at Manhattan. The winter ration consisted of alfalfa hay free choice plus 2 pounds of sorghum grain per head daily.

May 9, 1958, the calves were divided into two groups on the basis of weight. Each group of steers was placed in a pasture with other cattle. The pastures are quite similar insofar as parent soil material, contour, forage composition, and forage production are concerned. Cattle in one pasture have access to a mixture of plain salt and bonemeal, while those in the other pasture have access to a mixture of trace mineral salt[1] and bonemeal.

Observations

The cattle have been on pasture continuously since May 9, 1958. Winter supplementation consisted of 1½ pounds of soybean meal per animal per day plus prairie hay when snow covered the ground. They will remain on pasture through the 1959 pasture season. At the end of the 1958 pasture season there were no apparent differences in the animals in the two lots. Summer weight gains were essentially the same for all animals.

Results to date are summarized in Table 18.

1. Furnished by Morton Salt Company.

Table 18

Supplemental trace minerals for calves on sandstone pasture.

Treatment	Control	Trace mineral salt
Number animals	12	12
Av. initial wt., lbs.	551	550
Av. wt., 7-28-58, lbs.	652	631
Av. wt., 10-10-58, lbs.	701	697
Av. summer gain, lbs.	150	147

The Use of Tranquilizer Compounds[1 2] in Fattening Rations for Steers. Project A-597.

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

The steers used in this fattening trial were part of a larger group used in a wintering study reported on page 54 of Kansas Circular 358. At the beginning of the fattening period the ration was gradually changed from a high roughage, wintering type, to a high energy, fattening type. Individual calves remained in the same experimental groups as during the wintering trials but the groups were moved from the outdoor lots to concrete lots in which shelter was available.

The steers were brought to a full feed of sorghum grain and alfalfa hay plus 1 pound of soybean meal per head per day during the first 4 weeks of the study. After the cattle were on full feed, sorghum grain and alfalfa hay were available to them at all times on a free-choice basis. The soybean meal was fed once per day and was scattered over the grain in the feed bunk. The tranquilizer compound for each treatment lot was carried in the soybean meal.

During this fattening period the cattle suffered from a severe outbreak of foot-rot. Almost all animals in all lots were under veterinary care at one time or another. Apparently some animals suffered very little from the infection, while others lost as much as 40 pounds in weight during a particular 28-day period. For this reason the data obtained are being reported with no conclusions or observations. In another study reported in this circular, Tran-Q apparently gave excellent results when added to the fattening ration.

Table 19

The use of tranquilizer compounds[1 2] in fattening rations for steers. Project A-597.

Fattening—April 24, 1958, to August 22, 1958—120 days.

Treatment	Control	Paxital[1]	Tran-Q[2]
Number steers per lot	9[3]	10	10
Av. initial wt. per steer, lbs.	738	739	737
Av. final wt. per steer, lbs.	947	965	964
Av. total gain per steer, lbs.	209	226	227
Av. daily gain per steer, lbs.	1.74	1.88	1.89
Standard error	±.04	±.07	±.12
Daily ration per steer, lbs.:			
Ground sorghum grain	15.70	16.80	16.24
Soybean oil meal	1.00	1.00	1.00
Alfalfa hay	5.82	5.63	5.83
Salt	.04	.03	.03
Bonemeal-salt	.05	.04	.04
Paxital, mgs.[4]		75	
Tran-Q, mgs.[4]			2.5
Feed per cwt. gain, lbs.:			
Ground sorghum grain	902	864	859
Soybean meal	58	53	53
Alfalfa hay	334	299	308
Salt	2	2	2
Bonemeal-salt	2	2	2
Paxital, mgs.		3980	
Tran-Q, mgs.			133
Feed cost per cwt. gain[5]	$22.74	21.54	21.51
Carcass grades, U.S.D.A.:			
Av. choice			
Low choice	1	3	2
High good	3	3	5
Av. good	3		2
Low good	1	3	1
High standard	1	1	

1. Paxital is the brand name of a tranquilizer furnished by H. B. Penick and Co., New York, N.Y.
2. Tran-Q is the brand name of a tranquilizer furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
3. One animal died 47 days after test began.
4. Fed in the soybean meal.
5. Not including tranquilizer cost or mixing cost.

Table 19 (Continued)

Av. U.S.D.A. grade[6]	11.2	11.4	11.8
Av. marbling score[7]	8.0	7.2	7.0
Av. fat thickness score[8]	3.2	3.2	3.6
Av. firmness score[9]	4.5	4.1	4.2
Av. ribeye size, sq. in.[10]	10.46	9.96	10.07

6. Average grade determined as follows: high choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10; high standard, 9.
7. Visual marbling score determined as follows: moderate, 5; modest, 6; small amount, 7; slight amount, 8.
8. Visual fat covering at 12th rib: moderate, 3; modest, 4; slightly thin, 5.
9. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.
10. Measured at the 12th rib.

Stilbestrol[1] and Synovex[2] Implants (and Reimplants) for Steers on a Fattening Ration, Project 253-6.

B. A. Koch, Ed F. Smith, R. F. Cox, D. Richardson, and G. L. Walker

The steers used in this fattening trial were part of a larger group used in a wintering trial reported on page 46 of Kansas Circular 358. At the beginning of the fattening period the ration was gradually changed from a high roughage, wintering type, to a high energy, fattening type. Also at that time five of the steers in the stilbestrol lot were reimplanted with 24 mgs. of diethylstilbestrol and five steers in the synovex lot were reimplanted with synovex. Individual calves remained in the same experimental group as during the wintering study but the groups were moved from the outdoor lots to concrete lots in which shelter was available.

The steers were brought to a full-feed of sorghum grain and alfalfa hay plus 1 pound of soybean meal per head per day during the first 4 weeks of the trial. After they were on full-feed alfalfa hay and sorghum grain were available at all times on a free-choice basis. The soybean meal was fed once per day and was scattered over the grain in the feed bunk.

During this fattening trial the cattle suffered from a severe outbreak of foot-rot. Almost all animals in all lots were under veterinary care at some time and some individuals were treated for recurring cases of the infection. In some cases the animals apparently suffered very little while other animals showed large losses of body weight during the period of infection. For this reason the data obtained are being reported with no conclusions or observations. Previous tests reported in Kansas Circulars 349 and 358 have indicated that fattening calves do show a favorable response to both stilbestrol and Synovex implants and reimplants.

1. Supplied by Chas. Pfizer & Co. (24 mgs. per steer implanted in the ear; 24 mgs. reimplant also).
2. Supplied by E. R. Squibb & Sons. (Each implant contained 200 mgs. of progesterone plus 20 mgs. of estradiol benzoate.)

Table 20

The use of stilbestrol[1] and synovex[2,3] implants for steers during the fattening period. Project 253-6.

Fattening—April 24, 1958, to August 22, 1958—120 days.

I—By Pens

Treatment	Control	Synovex[3] implant	Stilbestrol[1] implant
Number steers per lot	9[4]	10	10
Av. initial wt. per steer, lbs.	738	783	758
Av. final wt. per steer, lbs.	947	1011	1002
Av. total gain per steer, lbs.	209	228	244
Av. daily gain per steer, lbs.	1.74	1.90	2.04
Standard error	±.04	±.11	±.07
Daily ration per steer, lbs.:			
Ground sorghum grain	15.70	16.88	16.30
Soybean oil meal	1.00	1.00	1.00
Alfalfa hay	5.82[5]	5.94[5]	5.72[5]
Salt	.04	.03	.03
Bonemeal-salt	.05	.04	.04
Feed per cwt. gain, lbs.:			
Ground sorghum grain	902	888	799
Soybean oil meal	58	53	49
Alfalfa hay	334	313	280
Salt	2	2	2
Bonemeal-salt	3	2	2
Feed cost per cwt. gain	$ 22.74	22.13[6]	19.96[6]
Carcass grades, U.S.D.A.:			
Av. choice			
Low choice	1		
High good	3	2	3
Av. good	3	1	2
Low good	1	4	4
High standard	1	3	1
Av. U.S.D.A. grade[7]	11.2	10.2	10.7
Av. marbling score[8]	8.0	8.0	7.6
Av. fat thickness score[9]	3.2	3.7	3.8
Av. firmness score[10]	4.5	4.5	4.4
Av. ribeye size, sq. in.[11]	10.46	9.72	10.20

II—Treatment

Treatment	Control	Synovex[3] implant	Synovex[3] reimplant	Stilbestrol[1] implant	Stilbestrol[1] reimplant
Lot number	1	2	2	3	3
Number of steers per lot	9[4]	5	5	5	5
Av. initial wt. per steer, lbs.	738	785	781	757	758
Av. final wt. per steer, lbs.	947	1017	1005	984	1020
Av. total gain per steer, lbs.	209	232	224	227	262
Av. daily gain per steer, lbs.	1.74	1.93	1.87	1.89	2.18
Standard error	±.04	±.14	±.18	±.12	±.07
Carcass grades, U.S.D.A.:					
Av. choice					
Low choice	1				
High good	3	1	1		3
Av. good	3	1		2	
Low good	1	2	2	3	1
High standard	1	1	2		1
Av. U.S.D.A. grade[7]	11.2	10.4	10.0	10.4	11.0
Av. marbling score[8]	8.0	8.0	8.0	7.6	7.6
Av. fat thickness score[9]	3.2	3.6	3.8	3.8	3.8
Av. firmness score[10]	4.5	4.4	4.6	4.4	4.4
Av. size ribeye, sq. in.[11]	10.46	9.40	10.14	10.08	10.32

1. Supplied by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
2. Supplied by E. R. Squibb and Sons, New Brunswick, N.J.
3. Each implant contained 200 mgs. Progesterone plus 20 mgs. estradiol benzoate.
4. One animal died 47 days after test began.
5. Each animal also received 225 lbs. of sorghum silage during the first 15 days of this fattening period.
6. Implant cost not included.
7. Average grade determined as follows: high choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10; high standard, 9.
8. Visual marbling score determined as follows: moderate, 5; modest, 6; small amount, 7; slight amount, 8.
9. Visual fat covering at 12th rib: moderate, 3; modest, 4; slightly thin, 5.
10. Firmness of ribeye: firm, 2; moderately firm, 3; modestly firm, 4; slightly firm, 5.
11. Measured at the 12th rib.

Feeding a Tranquilizer to Fattening Steer Calves (with and without Diethylstilbestrol). Project A-626.* A Progress Report.

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

Several of the tranquilizer materials have shown promise when included in fattening rations of steers under certain conditions. However, results reported have not been consistent, and further work is needed to definitely establish the value of these additives in fattening rations.

The study reported here was designed to study the effect of one tranquilizer, Trifluomeprazine, on the performance of beef steers receiving a fattening ration. The tranquilizer is being fed with and without added diethylstilbestrol.

Experimental Procedure

Steers used in this study were the heavy end of a group purchased near Paducah, Texas, in early fall, 1958. Sixty head of steer calves averaging approximately 570 pounds in weight were randomly allotted, according to weight, into six treatment groups of 10 each. Treatment groups are as follows:

1. Control ration.
2. Control plus 10 mgs. oral diethylstilbestrol[1] per head per day.
3. Control plus 2.5 mgs. Trifluomeprazine[2] per head per day.
4. Control plus 5.0 mgs. of Trifluomeprazine per head per day.
5. Control plus 10 mgs. of diethylstilbestrol plus 2.5 mgs. of Trifluomeprazine per head per day.
6. Control plus 10 mgs. of diethylstilbestrol plus 5.0 mgs. of Trifluomeprazine per head per day.

The daily ration being fed includes 10 pounds of sorghum silage, 1.5 pounds of alfalfa hay, 1.0 pound of soybean meal and a variable quantity of cracked corn. After 108 days on feed, the steers' cracked corn consumption varies from 13.5 pounds to 16.5 pounds per head per day. Corn and silage are fed mixed together in the bunks. The soybean meal is used as a carrier for the appropriate additive and is fed with the corn and silage.

The cattle are in concrete lots which have open sheds on the north side. Each lot is equipped with an automatic waterer. Salt and a mixture of salt and bonemeal are available to the animals at all times.

Observations

Average weight gains for the first 108 days of the study are reported in Table 21. Weight gains of these calves are similar to those reported on another page for individually-fed calves receiving the same additives in their rations. None of the animals shows any visible evidence of sedation or quietness. Nor have any undesirable side effects been observed. To date it appears that stilbestrol is stimulating rate of gain the most. Trifluomeprazine apparently is effective at the 5-mg. level. However, the increased gains due to feeding either stilbestrol or tranquilizer do not appear to be additive when the compounds are fed together. Final conclusions will be made at the end of the study.

*Partially supported by a grant-in-aid from Smith, Kline & French Labs., Philadelphia, Pa.

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

Table 21

Feeding a tranquilizer to fattening steer calves (with and without the addition of diethylstilbestrol). First 108 days on feed.

Treatment	Control	Stilbestrol[1]	2½ mgs.[2] TFM	5 mgs. TFM	2½ mgs. TFM + stilbestrol	5 mgs. TFM + stilbestrol
Number of steers	10	10	10	10	10	10
Av. initial wt., lbs.	576	566	580	562	580	574
Av. total gain, lbs.	222	310	221	274	250	282
Av. daily gain, lbs.	2.06	2.87	2.05	2.54	2.31	2.61

1. Diethylstilbestrol.
2. Trifluomeprazine.

Tranquilizers in the Fattening Ration of Individually-fed Steers (with and without Added Diethylstilbestrol). Projects A-597* and A-626. A Progress Report.

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

Some of the recent experimental work indicates that tranquilizers may be of value in the fattening ration of beef cattle. There is also some evidence that these compounds may be of further value when used in combination with other additives.

This study is designed to determine the effect of tranquilizers fed with and without diethylstilbestrol, on the performance of beef steers receiving a fattening ration. Steers are being individually fed. During the study each animal will be placed in a metabolism stall at intervals for collection of urine and feces. Thus, it will also be possible to determine the effect of the various additives on body nitrogen retention, digestibility of the ration, and ration energy utilization.

Experimental Procedure

Twenty-four steer calves weighing approximately 500 pounds each were randomly allotted, according to weight, into six treatment groups of four each. Animals are being individually fed twice daily. During the part of the day when they are not eating, the calves are penned together 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.

Animals were placed on their respective treatments February 3, 1959. Treatment groups are as follows:

1. Control ration.
2. Control plus 10 mgs. of oral stilbestrol[1] per head per day.
3. Control plus 2.5 mgs. of Tran-Q[2] per head per day.
4. Control plus 5.0 mgs. of Trifluomeprazine[3] per head per day.
5. Control plus 10 mgs. of oral stilbestrol plus 2.5 mgs. Tran-Q per head per day.
6. Control plus 10 mgs. of oral stilbestrol plus 5.0 mgs. Trifluomeprazine per head per day.

Metabolism studies were started April 1 when six calves, one from each treatment group, were placed into metabolism stalls. 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. Representative samples of all feed, feces, and urine collections will be analyzed in the nutrition laboratory of the Department of Animal Husbandry. Over an eight-week period all 24 calves will have spent one seven-day collection period in the metabolism stalls.

The calves receive a daily ration of cracked corn, soybean meal, sorghum silage, and chopped alfalfa hay. Each calf receives 1 pound of soybean meal per day and this contains the approximate additive. Sorghum silage is limited to 10 pounds per day and chopped alfalfa hay to 1.5 pounds per day. Cracked corn is fed according to the appetite of each calf.

Observations

Average weight gains to date of the calves in each treatment group are presented in Table 22. Weight gains of these individually-fed calves are similar to those of group-fed calves receiving the same ration and described in another report in this bulletin. None of the animals shows any visible evidence of sedation or calming. Neither are any undesirable side effects evident at this time. Final conclusions will be made at the end of the study.

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

1. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.
2. Tran-Q furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.
3. Trifluomeprazine furnished by Smith, Kline & French Labs., Philadelphia, Pa.

Table 22

Tranquilizers in the fattening ration of individually-fed steers (with and without diethylstilbestrol). First 40 days on test.

Treatment	Control	Stilbestrol[1]	Tran-Q[2]	TFM[3]	Stilbestrol + Tran-Q	Stilbestrol + TFM
No. of steers	4	4	4	4	4	4
Av. initial wt., lbs.	518	506	519	525	510	527
Av. total gain, lbs.	109	127	110	120	128	130
Av. daily gain, lbs.	2.22	2.59	2.24	2.45	2.51	2.65

1. Diethylstilbestrol
2. Tran-Q (hydroxyzine)
3. Trifluomeprazine

The Effect of Shade and Hormone Implant on Fattening Yearling Heifers, 1958.

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

This is the second year of an experiment designed to study the value of shade for beef cattle under Kansas environmental conditions. In cooperation with the Department of Agricultural Engineering, shades were designed and constructed from material made available by commercial interests. The contributors were American Iron and Steel Institute, American Zinc Institute, and Dierks Forests, Inc.

As a part of the 1957 shade study, five heifers within each lot were implanted with Synovex heifer implant (20 mgs. estradiol benzoate and 100 mgs. of testosterone) to determine the value of this implant and shade on the performance of heifers in drylot. This experiment was repeated in 1958 by adding two lots of implanted heifers, one shaded, and one in the sun.

Experimental Procedure

Fifty head of Hereford heifers averaging 640 pounds per head were used. They were placed in five lots, 10 head per lot, on the basis of live weight.

The heifers were on test from June 12 to November 30, 1958 (140 days). At the beginning of the experiment the heifers were consuming 5 pounds of sorghum grain, 1 pound of soybean meal, and 6 pounds of alfalfa hay 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 shades were constructed from corrugated sheet iron and attached to 16 x 20 foot wooden frames. The frames were then placed on posts 12 feet high. The top side of the sheet iron was covered with white paint. The shades provided 64 square feet of shade per animal.

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 containing 20 mgs. of estradiol benzoate and 100 mgs. of testosterone.

Results and Observations

Table 23 shows the results of this experiment.

1. Shade improved the average daily gain of implanted heifers 0.12 pound more per head daily than those without shade.
2. The average daily gains of the nonimplanted heifers having no shade were essentially the same as the gains made by the nonimplanted heifers having access to shade.
3. Implanted heifers having access to shade gained 0.35 pound more per head daily than those receiving no implant and no shade. Thus, the combined effects of shade and hormone implant were 0.35 pound increase in daily gain per head.
4. Implanted heifers having no shade gained 0.23 pound more per head daily than the nonimplanted heifers having no shade.
5. Implanted heifers having shade gained 0.36 pound more per head daily than the nonimplanted heifers having shade.
6. Shade alone had no effect upon efficiency of feed utilization.
7. Implanted heifers were more efficient in feed efficiency than nonimplanted heifers.
8. Heifers that were implanted and had access to shade were the most efficient in feed utilization.
9. There was only a very slight difference in the average carcass grade of the various lots of heifers.
10. Shade had no influence upon ribeye size in square inches. The heifers receiving the implant, regardless of shade, had larger ribeye muscles. However, this is probably due to the fact that the implanted heifers were heavier, since both nonimplanted and implanted heifers had the same in square inches of ribeye muscle, 0.0115, per pound of body weight.

11. The difference between lots in thickness of fat at the 12th rib, degree of marbling and firmness was very slight.
12. There were no undesirable side effects due to hormone implants.

Table 24 illustrates the effects of certain climatic factors on the average daily gains of yearling heifers by periods. Increased temperature and radiation depressed average daily gains irrespective of shade. Also, the heifers responded to a moderation of temperature and radiation, as indicated by an increase in daily gains during periods three and four. However, the summer of 1958 was very mild compared with the summer of 1957. The temperature was never above 100° F. This mildness is reflected in the desirable response of these cattle during the summer fattening period.

Table 23

The effect of shade and hormone implant[1] on fattening yearling heifers.

June 12, 1958, to November 30, 1958—140 days.

Lot number	1	2	3	4	5
Number heifers per lot	10	10	10	10	10
Management	No shade	No shade	Shade	No shade, implant	Shade, implant
Av. initial wt. per heifer, lbs.	622	651	646	621	628
Av. final wt. per heifer, lbs.	910	922	924	933	957
Av. gain per heifer, lbs.	288	271	278	312	329
Av. daily gain per heifer, lbs.	2.06	1.94	1.99	2.23	2.35
Av. daily ration per heifer, lbs.:					
Ground sorghum grain	13.40	13.78	14.5	14.13	14.40
Soybean oil meal	1.00	1.00	1.00	1.00	1.00
Alfalfa hay	5.19	5.19	5.19	5.19	5.19
Lbs. feed per cwt. gain:					
Ground sorghum grain	652.2	711.6	732.0	634.2	614.5
Soybean oil meal	48.6	51.7	50.4	44.9	42.6
Alfalfa hay	252.0	267.9	261.1	232.7	220.7
Total feed per cwt. gain	952.8	1031.2	1043.5	911.8	877.8
Feed cost per cwt. gain[2]	$17.03	18.48	18.83	16.39	15.80
Selling price per cwt. at market	$25.75	25.75	25.75	25.75	25.75
Dressing %	58.3	58.6	58.1	59.5	58.5
Carcass data					
Carcass grades, USDA:					
Average choice		1	1		
Low choice			1		
High good	8	9	8	10	7
Average good	2				3
Low good					
Av. carcass grade[3]	17.9	18.2	18.3	18	17.7
Av. size of ribeye[4]	4.0	3.8	3.9	4.0	4.0

1. Synovex heifer implant—20 mgs. estradiol benzoate and 100 mgs. testosterone. Squibb and Sons.

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

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

4. Very large, 1; large, 2; moderately large, 3; modestly large, 4; slightly large, 5; visual estimate.

Table 23 (Continued)

Av. size of ribeye, sq. in.[5]	10.83	10.34	10.43	10.93	10.93
Av. fat thickness at 12th rib[6]	4.2	3.9	4.0	4.0	3.9
Av. fat thickness at 12th rib, in.[7]	.56	.59	.58	.66	.56
Av. degree of marbling[8]	7.7	7.3	7.1	7.6	7.8
Av. degree of firmness[9]	4.0	3.8	3.7	4.0	3.9

5. Planimeter reading of ribeye muscle.

6. Very thick, 1; thick, 2; moderately thick, 3; modestly thick, 4; slightly thin, 5; visual estimate.

7. Reciprocal Meat Conference Standards, 1952.

8. Modest, 6; small amount, 7; slight amount, 8; trace, 9; visual estimate.

9. Very firm, 1; firm, 2; moderately firm, 3; modestly firm, 4; slightly soft, 5; soft, 6; visual estimate.

Table 24

Effect of certain climatic factors on average daily gains of yearling heifers by periods.

Drylot fattening period—June 12, 1958, to November 30, 1958—140 days.

Period	1	2	3	4	5
Date	6/12-7/10	7/11-8/7	8/8-9/4	9/5-10/2	10/3-10/30
Av. maximum temperature[1]	88.2	88.4	85.8	78.9	77.2
Av. radiation[2]	604.8	496.1	531.2	395.3	384.6
Av. wind movement[3]	172.1	123.6	118.1	141.6	128.2
Av. relative humidity[4]	60.2	63.2	55.8	62.7	46.5
Av. daily gain:					
Lot 1. No shade	2.36	1.50	2.08	2.61	1.79
Lot 2. No shade	1.14	2.17	1.31	2.50	2.50
Lot 3. Shade	1.93	1.66	2.04	2.32	2.00
Lot 4. No shade, implant	2.96	1.70	1.85	2.57	2.07
Lot 5. Shade, implant	2.57	2.40	2.31	2.35	2.35

1. Reading made daily at 7 p.m.; thus maximum temperature will have occurred. Thermometer in standard thermometer shelter.

2. Reading in Langleys. Langleys x 3.69 = BTU's per square foot.

3. Wind movement is miles per hour past the station.

4. Reading from an autographic hygrograph exposed in thermometer shelter.

The Use of Antibiotics at Shipping Time To Suppress the Occurrence of Respiratory Complex in Cattle.

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

One of the major problems confronting cattlemen is control of the occurrence of respiratory diseases such as shipping fever, colds, nasal congestion, and pneumonia. These respiratory conditions are especially troublesome to cattle feeders who ship and receive cattle during the fall and winter months, when adverse weather conditions put added stress on cattle.

This study is to investigate the value of various antibiotics administered orally or by injection to weaning calves to control the occurrence of respiratory diseases during the first few weeks they are in drylot.

Experimental Procedure

The calves used in this experiment originated on the Jeff Ranch, Fort Davis, Texas. They were gathered early in the morning, weaned from the cows, loaded into trucks and hauled 54 miles to Alpine, Texas. Upon arrival at the yards, they were group weighed and randomly allotted into four lots, with about equal numbers of steers and heifers in each lot. Each lot was marked for identification and given its designated treatment by injection. On arrival in Manhattan, the calves were unloaded and trucked from the railroad yards to the experimental unit, at which time they were group weighed by treatments. Thereafter they were weighed each day until their initial weight was reached.

During the first two weeks after arrival, the calves were inspected daily for occurrence of respiratory involvements, and other symptoms of illness. They were fed 2 pounds of wheat bran per head daily, and alfalfa hay free choice.

Observations

Table 25 gives the results of this study. Some observations concerning the data presented are:

1. Although there was less percentage shrink by calves receiving penicillin-streptomycin and terramycin injections, the difference between the groups and the control group in average pounds of weight lost per head was small and probably not significant.

2. All groups required the same amount of time to recover the shrink lost.

3. There was no occurrence of respiratory illness suggestive of shipping fever in any lot.

Table 25

Use of tranquilizer and antibiotics to control shipping fever complex and transit shrink of weaning beef calves.

Treatment	Control	Strepto-mycin[3]	Penicillin-Streptomycin[4]	Terramycin[5]
Number of calves	47	48	53	52
Av. initial wt. per head[1]	446	447	430	450
Av. final wt. per head[2]	417	419	412	432
Av. lbs. shrink per head	29	28	18	18
% shrink	6.5	6.3	4.2	4.0
Day required to recover shrink	7	7	6	6
No. of calves treated for illness	0	0	0	0

1. Weight at Alpine, Texas.

2. Weight at Manhattan, Kans.

3. Streptomycin sulfate suspension. Merck, Sharp & Dohme, West Point, Pa.

4. Procaine Penicillin G in Dihydrostreptomycin sulfate solution. Pro-K-Mycin. American Cyanamid, New York, N.Y.

5. Terramycin—Pfizer & Company, Terre Haute, Ind.

6. Weights made each day until initial weight was reached.

Fattening Heifer Calves on Dry Bluestem Pasture versus Fattening in Drylot. Project 252-2.

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

Considerable work has been done at this station to determine the performance of cattle being fattened on summer pasture compared with fattening in drylot. This experiment is to study the feasibility of fattening cattle on dry bluestem pasture versus fattening in drylot.

Experimental Procedure

Heifers used in this experiment were the light end of calves purchased from the Pumray Ranch, Logan, N.M., the fall of 1957. Twenty-one heifers were placed in two groups on the basis of live weight and grade. One lot of 10 heifers, averaging 316 pounds each, was placed on 18 acres

of dry mature bluestem pasture. The second lot of 11 heifers was put in drylot.

The roughage portion of the ration for the pasture and drylot heifers consisted of dry bluestem grass and prairie grass hay, respectively. The concentrate fed to both lots of heifers consisted of a mixture of 75 percent ground sorghum grain, 10 percent dehydrated alfalfa meal, 10 percent soybean oil meal, and 5 percent molasses made into a ⅜-inch pellet. Both the roughage and concentrate were fed free choice.

Observations and Results

The results of this experiment appear in Table 26. Observations and results under the conditions of this trial were as follows:

1. Heifers fattened in drylot were more desirable in practically every respect. They made 0.64 pound more average daily gain, and consequently gained 65 pounds more per head for the fattening period of 176 days.

2. Drylot-fattened heifers produced gain for $2.60 less per cwt. than the pasture-fattened heifers.

3. The pasture-fattened heifers sold for less on the market, had a greater shrink to market, but yielded slightly higher than the drylot heifers.

4. The average carcass grade for the drylot- and pasture-fattened heifers was average good and high standard, respectively. This is an advantage of two thirds of one grade for the drylot heifers.

5. The drylot heifers had larger ribeyes, more marbling, a firmer lean, and thicker fat at the 12th rib.

Table 26

Fattening heifer calves on dry bluestem pasture versus fattening in the drylot.

December 12, 1957, to June 8, 1958—176 days.

Treatment	Pasture	Drylot
No. calves per lot	10	11
Av. initial wt. per head	346	351
Av. final wt. per head	643	713
Av. gain per head	297	362
Av. daily gain per head	1.69	2.05
Av. daily ration:		
Pasture	6 months	
Prairie hay, lbs.		3.6
Pellet, lbs.[1]	10.6	13.3
Lbs. feed per cwt. gain:		
Pasture	6 months	
Prairie hay, lbs.		175
Pellet, lbs.	628	647
Feed cost per cwt. gain	$19.94	17.34
Selling price per cwt. at market	25.00	26.00
% shrink to market	4.6	3.3
Dressing %	58.5	58.0
Carcass data, USDA grades:		
Av. standard	3	
High standard	4	
Low good	2	3
Av. good	1	2
High good		5
Low choice		1
Av. carcass grade[2]	15.1	17.4
Av. fat thickness at 12th rib[3]	5.0	4.0

1. Pellet—⅜ inch diameter pellet composed of 75% ground sorghum grain, 10% dehydrated alfalfa meal, 10% soybean oil meal, and 5% molasses.

2. Low choice, 19; high good, 18; average good, 17; low good, 16; high standard, 15; average standard, 14.

3. Very thick, 1; thick, 2; moderately thick, 3; modestly thick, 4; slightly thin, 5.

Table 26 (Continued)

Av. degree of marbling[4]	9.5	8.2
Av. size of ribeye[5]	5.0	4.0
Av. firmness of lean[6]	4.2	4.0

4. Modest, 6; small amount, 7; slight amount, 8; traces, 9.

5. Very large, 1; large, 2; moderately large, 3; modestly large, 4; slightly small, 5.

6. Very firm, 1; firm, 2; moderately firm, 3; modestly firm, 4; slightly soft, 5; soft, 6.

Adapting Roughages Varying in Quality and Curing Processes to the Nutrition of Beef Cattle, 1958-1959. Project 370.

Pelleted Alfalfa Hay and Dehydrated Pelleted 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

Alfalfa hay and sorghum silage are used extensively in the winter rations of cattle in Kansas, and considerable experimental work has been done with these two roughages to determine their value in winter rations.

In recent years much attention has been given to the physical form in which a roughage should be harvested, stored, and fed to cattle. This experiment is 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 forage sorghum pellets.

Experimental Procedure

The hay used in this study consisted of good-quality, third-cutting alfalfa. It was cut, cured, and baled in the field and stored in a conventional hay shed. After having been in storage 2 months, a part of the alfalfa hay was removed from the barn, coarsely ground through a ¼-inch screen, made into ⅜-inch pellets by a local feed processor, and stored for later feeding.

The forage-type sorghum was field harvested in mid-October with the usual silage equipment. The loads were alternately ensiled in upright silos or dehydrated, finely ground, and pelleted into ¾-inch pellets. These pellets were then stored in bulk for later feeding.

The prairie hay used was of good quality. It was grown on a local farm meadow.

Fifty head of choice-quality heifer calves from the Jeff Ranch, Fort Davis, Texas, were used in this experiment. They were allotted into five lots, 10 head per lot, on the basis of live weight. They were fed a winter ration consisting entirely of alfalfa hay or pellets and either sorghum silage or dehydrated pelleted sorghum for 126 days.

The winter ration fed each lot per head daily was as follows:

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

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

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

Lot 4. Five pounds alfalfa pellets plus dehydrated sorghum pellets free choice.

Lot 5. Five pounds alfalfa pellets plus dehydrated sorghum pellets free choice plus 1.0 pound prairie hay.

Results and Observations

The results of this experiment are reported in Table 27. An examination of this table reveals the following:

1. Average daily gains made by the heifers were considered satisfactory in all lots.

2. Using lot 1, which received alfalfa hay and silage, as a control, there was a statistically significant difference between the average daily gains made by the heifers in lot 1 and lots 2, 3, 4, and 5.

3. The percentage increase in average daily gain made by the heifers in lots 2, 3, 4, and 5 over lot 1 was 20, 28, 50, and 43, respectively.

4. There was no statistically significant difference between the gains made by lots 2 and 3 or lots 4 and 5. This may be interpreted as meaning that the increased average daily gains due to pelleting either alfalfa hay or forage-type sorghum over nonpelleting were significant, and that the addition of 1 pound of prairie hay per head per day to an all-pelleted roughage ration did not significantly change the average daily gains.

5. The increased gains resulting from feeding pelleted alfalfa hay and dehydrated pelleted forage sorghum together were significantly greater than when only one of the roughages was pelleted.

6. Under this system of feeding where the alfalfa hay pellets were limited to 5 pounds per head per day and the dehydrated pelleted forage sorghum was fed free choice, the pelleted alfalfa hay affected the variability of gains between lots 28 percent, whereas the pelleted forage sorghum effect was 52 percent. Therefore, it was more advantageous to pellet the forage sorghum than the alfalfa under this feeding regime.

7. There were no adverse effects of an all-pelleted forage ration upon the heifers in lot 4. This was the most uniformly performing lot of the experiment.

8. The average dry matter consumed per head per day increased sharply when dehydrated pelleted forage sorghum was fed. The dry matter consumed increased 2, 34, 39, and 41 percent for lots 2, 3, 4, and 5, respectively, over lot 1.

9. The largest quantity of dry matter required per cwt. gain was in lot 1 where alfalfa hay and silage were fed. The smallest quantity of dry matter required per cwt. gain was by lot 2, silage and alfalfa pellets, and lot 4, pelleted alfalfa hay and dehydrated pelleted forage sorghum.

10. Feed cost per cwt. gain reflects not only the price of feed, but the increased dry matter consumption. As the dry matter consumption increased, the cost per cwt. gain increased.

Table 27

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

Wintering—November 24, 1958, to March 30, 1959, incl.

Lot number	1	2	3	4	5
No. heifers per lot	10	10	10	10	10
Av. initial wt. per heifer, lbs.	406	406	406	403	406
Av. final wt. per heifer, lbs.	538	565	575	602	596
Av. gain per heifer, lbs.	132	159	169	199	190
Av. daily gain per heifer, lbs.	1.05	1.26	1.34	1.58	1.51
Percentage increase in av. daily gain		20	28	50	43
Av. daily ration per heifer, lbs.:					
Alfalfa hay	5.0		5.0		
Ground alfalfa hay pellets		5.0		5.0	5.0
Sorghum silage[2]	21.4	22.0			
Dehydrated pelleted sorghum[3]			11.0	11.6	10.9
Prairie hay					1.0
Av. dry matter consumed per head per day	11.26	11.45	15.08	15.65	15.90
Percentage increase in dry matter consumption		2	34	39	41
Lbs. feed per cwt. gain:					
Alfalfa hay	477		373		
Ground alfalfa hay pellets		396		317	332
Sorghum silage	2041	1744			
Dehydrated pelleted sorghum			817	736	723
Prairie hay					66
Av. dry matter required per cwt. gain	1074.38	907.18	1121.76	992.66	1055.14
Av. feed cost per cwt. gain[1]	$7.72	8.91	12.27	12.85	13.24

1. Feed prices may be found inside back cover.
2, 3. Contributed by CK Dehydrating Ass'n, Salina, Kans.

Improvement of Beef Cattle Through Breeding Methods. Project 286.
W. H. Smith, L. A. Holland, and J. D. Wheat

The purebred Shorthorn cattle-breeding project was continued during 1958 and thus far in 1959 according to the plans and breeding programs established in 1949. Two inbred lines have been established. These are referred to as the Wernacre Premier and the Mercury lines with reference to the foundation sires which were used initially for the development of the two lines. The Wernacre Premier line has reached the fourth generation of inbreeding, while the Mercury line is in the third generation of inbreeding at present. During 1957 only one inbred Wernacre Premier bull was retained for breeding purposes. This bull proved to be sterile during the early breeding season, which necessitated the breeding of the Wernacre Premier line females to an inbred Mercury line bull. This situation resulted in the production of a number of line-cross calves during 1958. Two inbred Wernacre Premier bulls are available in the experimental cattle at this time. One of these was used as a sire during 1958, so the continuation of the inbreeding program with the Wernacre Premier line has been resumed and will continue in the future. The basic inbreeding plan has been the continued mating of half-brothers to half-sisters during the progress of the study.

This experiment was initiated to study the inheritance of beef cattle production traits and to evaluate the effects of inbreeding on production. To date, no abnormalities, which could be attributed to inbreeding, have occurred in either of the inbred lines. Analyses of the data indicate that inbreeding has lowered the weaning weights of the calves.

To date, no extensive line crossing has been introduced in the experiment. More intensive line crossing will be initiated at some time in the future to study the feasibility of utilizing inbred lines of beef cattle for the breeding improvement of productivity.

Birth weight of calves and the weight of each cow are taken at the time of calving. The calves are born in the spring of each year as the result of summer pasture breeding. The calves are not creep fed during the suckling period while the cows are on grass. Calves are weaned at approximately 6 months of age, at which time they are scored for type and conformation and weighed. After a three-week adjustment period, the calves 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 and steers consists of 75 percent cracked corn and 25 percent chopped alfalfa hay; that for the heifers, 55 percent cracked corn and 45 percent chopped alfalfa hay.

Approximately one half of the bull calves were castrated each year prior to 1958. In 1958 none of the bulls was castrated, in order to in-

Table 28

Summary of the 1957 Shorthorn calves of the Wernacre Premier and Mercury lines and line crosses.

Tag number	Coefficient of inbreeding[1]	Birth weight	Weaning weight	Weaning score	Days fed	Initial weight	Final weight	Total gain	Average daily gain, lbs.	Final score	Pounds corn per 100 pounds gain	Pounds alfalfa per 100 pounds gain
Wernacre Premier Line												
Bulls												
56	10.94	69	410	2—	182	460	940	480	2.64	3+	410	214
Steers												
105	27.97	55	375	3	182	390	755	365	2.00	3	451	240
Heifers												
12	23.17	73	435	3+	182	430	787	357	1.96	3+	388	359
103	32.03	87	240	3	182	255	585	330	1.81	3—	382	352
52	32.03	58	254	2—	182	275	663	388	2.13	3	342	304
Av.	29.18	73	310	3+	182	320	678	358	1.97	3+	371	338
Mercury Line												
Bulls												
189	16.50	70	365	1	182	380	860	480	2.64	1	377	204
61	13.28	65	420	2+	182	495	1020	525	2.88	2+	293	229
13	11.23	58	360	2+	182	415	880	465	2.56	2	424	223
10A	14.46	67	376	1—	182	416	869	453	2.49	1—	419	211
15	6.44	65	368	2+	182	402	848	446	2.45	3+	410	211
6	13.48	68	291	1—	182	341	760	419	2.30	2—	428	211
5	14.18	64	412	1	182	450	947	497	2.73	1—	428	215
1	15.72	67	312	1—	182	339	854	515	2.83	2—	419	221
Av.	13.16	66	363	1—	182	405	880	475	2.61	2+	400	216
Steers												
8	6.25	70	320	2—	182	360	810	450	2.47	2+	417	221
68	8.01	59	260	3	182	275	635	360	1.98	2	404	210
36	3.91	81	300	2—	182	320	760	440	2.42	2	464	233
7	14.26	69	410	2	182	472	830	358	1.97	2	507	286
10	3.61	70	410	1—	182	540	940	400	2.20	2	447	293
Av.	7.21	70	340	2—	182	393	795	402	2.21	2	448	249
Heifers												
58	13.97	63	305	1—	182	335	657	322	1.77	2+	404	373
106	9.37	56	435	1	182	477	780	303	1.66	1—	477	449
31	13.48	55	390	1	182	400	670	270	1.48	1	448	422
11	9.03	56	380	2+	182	430	758	328	1.80	1	498	457
82	25.00	57	305	2+	182	310	631	321	1.76	2	411	374
173	3.61	57	270	3	182	300	638	338	1.86	2+	435	391
9	6.25	70	228	2—	182	252	623	371	2.04	2+	369	329
146	12.91	64	325	2+	182	330	661	331	1.82	2	414	375
2	15.72	74	305	1—	182	323	703	380	2.09	2+	366	326
38	7.03	58	271	2	182	296	619	323	1.77	1—	416	378
68A	12.50	61	216	3	182	220	575	355	1.95	2	420	390
49	6.25	62	282	2	182	280	600	320	1.76	2+	470	401
Av.	11.26	61	309	2+	182	329	660	330	1.81	2+	427	389
Line Crosses												
Bulls												
30		72	314	2—	182	346	817	471	2.59	3+	463	226
Steers												
3		65	266	3	182	307	715	408	2.24	3	456	225
87		80	354	3+	182	365		Failed to finish test				
Av.		73	310	3+	182	336		Failed to finish test				
Heifers												
72		80	311	2	182	334	713	379	2.08	2	387	348
4		62	236	2	182	267	655	388	2.13	2+	379	335
120		75	320	1—	182	330	650	320	1.76	1—	390	357
81		64	300	2—	182	300	641	341	1.87	2+	382	341
Av.		70	292	2	182	308	665	357	1.96	2+	385	345

1. The coefficient of inbreeding means the percentage of inbreeding. Individuals from brother-sister matings are 25 percent inbred, and individuals from mating half-brother to half-sister are 12.5 percent inbred. The line-cross calves are not inbred.

Table 29

Partial summary of the 1958 Shorthorn calves of the Mercury line and line crosses.

Tag number	Coefficient of inbreeding[1]	Birth weight	Weaning weight	Weaning score	Initial weight	Weight on 3-23-59	Days on trial	Daily gain during trial
				Mercury Line				
				Bulls				
5	13.28	57	386	2−	433	697	149	1.77
36	15.63	57	356	3+	385	690	149	2.05
7	14.84	64	305	2−	322	575	149	1.70
1	17.19	50	272	3	296	517	149	1.48
6	14.46	68	266	3+	287	540	149	1.70
3	6.44	72	297	3	315	554	149	1.60
173	17.19	60	334	2	357	465	76	1.42
31	16.41	57	286	3+	303	452	76	1.96
72	9.37	56	317	3+	340	502	76	2.13
4	13.48	70	345	2−	345	480	76	1.78
Av.	13.83	61	316	2−	338	547		1.76
				Heifers				
10	18.75	54	340	2−	385	590	149	1.38
15	14.06	52	298	3	326	526	149	1.34
13	16.80	53	285	2−	300	516	149	1.45
87	16.02	51	281	2−	305	459	149	1.03
30	14.45	60	298	3+	313	472	76	2.09
61	10.16	68	318	3+	325	465	76	1.84
106	13.48	65	325	2−	330	456	76	1.66
38	37.27	49	285	2−	292	406	76	1.50
52	15.72	75	280	2−	290	387	76	1.28
Av.	17.41	59	300	2−	318	475		1.51
				Line Crosses				
				Bulls				
189		70	470	2+	506	731	149	1.51
82		52	348	3+	372	545	76	2.28
146		50	365	3+	385	560	76	2.30
11		60	327	3	332	520	76	2.47
56		75	312	3	340	485	76	1.91
Av.		61	364	3+	387	568		2.09
				Heifers				
12		68	412	2	440	661	149	1.48
9		55	350	3	355	513	76	2.08
58		63	360	2−	351	467	76	1.53
2		57	320	3+	339	458	76	1.57
Av.		61	361	2−	371	525		1.67

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

crease the data obtained on the performance of bulls under feedlot conditions.

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 gains, but have required more feed per 100 pounds of live body weight gain than have the Mercury calves.

The initial weight and average daily gain have appeared to be related to feed efficiency. Calves possessing lighter initial weights and those making higher average daily gains within each line tend to be more efficient in feed utilization. Inbreeding has not appeared to be related to gaining ability or feed efficiency in either of the two lines.

The data for the 1957 calves are summarized in Table 28, and a partial summary of the 1958 calves appears in Table 29. Later these data will be summarized with those obtained in previous years for more conclusive analyses.

Swine

The Comparative Value of Shelled Corn and Hybrid Grain Sorghum Prepared for Feeding by Different Milling Processes. Project 110-2.

C. E. Aubel

Grain sorghums are being grown extensively in many parts of Kansas. Feeding tests with swine at this station have given excellent results when sorghum grain was compared with corn. Hybrid sorghum grains also have done well in the feedlot.

Mills and elevators now can process grains in ways not previously possible. Interest in the new processes is increasing because they 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. The ration for each lot varied in the following manner:

Lot 1. Whole hybrid sorghum grain.

Lot 2. Steam rolled hybrid sorghum grain.

Lot 3. Steam rolled hybrid sorghum grain with 5 percent molasses mixed in it.

Lot 4. Steamed hybrid sorghum with rolling or crimping delayed four hours.

Lot 5. Shelled corn.

The sorghum grain was steamed at 90 pounds pressure at 180° F.

Results of this experiment are presented in Table 30.

Table 30

The comparative value of shelled corn and hybrid grain sorghum prepared for feeding by different milling processes.

December 11, 1958, to March 21, 1959—100 days.

Ration fed	Whole hybrid sorghum, protein-mixed supplement	Steam rolled hybrid sorghum, protein-mixed supplement	Steam rolled + molasses hybrid sorghum, protein-mixed supplement	Steam rolled delayed crimp hybrid sorghum, protein-mixed supplement	Shelled corn, protein-mixed supplement
Lot number	1	2	3	4	5
Number pigs per lot	10	8	10	10	10
Av. initial wt. per pig, lbs.	53.10	53.20	53.10	53.40	53.00
Av. final wt. per pig, lbs.	180.60	165	193.50	177	181
Av. total gain per pig, lbs.	127.50	112.80	140.40	123.60	128
Av. daily gain per pig, lbs.	1.27	1.12	1.40	1.23	1.28
Av. daily ration per pig, lbs.:					
Milo	4.52	4.32	5.58	4.88	
Shelled corn					4.19
Protein supplement	.66	.67	.76	.67	.71
Pounds feed per 100 lbs. gain per pig:					
Milo	354.50	403.36	397.72	395.22	
Shelled corn					327.34
Protein supplement	52	60.17	54.20	61.56	55.62

Observations

The pigs in lot 3 receiving steam rolled grain sorghum with 5 percent molasses ate the most feed per day and made the largest gains, but did not convert their feed the most economically.

The whole-sorghum-grain-fed pigs in lot 1 made as rapid daily gains as the corn-fed pigs, but were not quite as efficient in their feed conversion.

All factors considered, the sorghum grains proved satisfactory. This is consistent with other experiments conducted at this station.

Metabolism of Carotenoid Pigments and Vitamin A by Swine. Project 311.

D. B. Parrish and C. E. Aubel

Previous work has indicated that vitamin A utilization and storage are reduced when pigs are infected with roundworms. Hygromix (S. hygroscopicus fermentation product. Lilly) has been used to reduce worm infection in growing pigs. This test was to determine whether pigs with worm infection made less effective use of provitamin A from dehydrated alfalfa than did pigs in which worm infestation was reduced by feeding Hygromix.

The liver and blood stores of 18 weanling pigs were reduced by feeding a vitamin A-free diet. When the pigs weighed an average of 53 pounds and serum vitamin A levels were reduced to an average of 12 micrograms per 100 mls., they were divided into six lots of three pigs each. Each lot was fed a pelleted growing feed composed of sorghum grain, soybean meal, brewer's yeast, dried skimmilk, bone meal, calcium carbonate, salt, and a trace mineral—vitamin premix. A high potency alfalfa was added to supply 600 units of vitamin A activity per pound. Three lots of pigs received 2½ pounds of Hygromix per 1000 pounds of feed, and three comparable lots did not receive Hygromix. The pigs were fed for 2 months, given the quantity that they would clean up. At the end of the experiment, data on weights, feed consumption, serum vitamin A levels, and ascarid egg counts in feces were obtained. The data are in Table 31.

Table 31

Effect of Hygromix in ration on vitamin A levels of blood serum.

Diet	Lot[1]	Av. wt. gain, lbs.	Lbs. feed per lb. gain	No. pigs infected, ascarid eggs	Vitamin A, micrograms per 100 mls. serum
Contains Hygromix ..	1	117	3.20	1	19.3
	2	140	3.07	0	18.4
	3	109	3.22	1	18.6
No Hygromix	4[2]	111	3.18	2	21.6
	5	133	2.85	2	22.8
	6	112	3.14	1	20.9

1. Three pigs per lot.

2. One pig lost 6 days before experiment ended. Death rather sudden, cause not determined.

Observations

In this test the pigs had only a mild worm infection. Fewer pigs receiving Hygromix were found to have ascarid eggs in the feces than those not receiving Hygromix. The differences in serum vitamin A levels and growth are not significant; therefore, pigs receiving Hygromix did not utilize the provitamin A, carotene, from alfalfa meal more effectively than those not receiving Hygromix.

The Value of the Antibiotics, Terramycin (TM-10) and Oleandomycin, in the Protein Supplement for Fattening Fall Pigs in Drylot in Winter. Project 110-1.

C. E. Aubel

A new antibiotic, Oleandomycin, has been brought out recently by Chas. Pfizer & Co., Inc.[1] This experiment was to test the value of this antibiotic.

Three lots of pigs were self-fed shelled corn and a mixed protein supplement as a basal ration. Each lot contained 10 pigs.

Lot 1 pigs were fed in drylot and received a mixed protein supplement of 4 parts tankage, 4 parts soybean meal, 1 part cottonseed meal, and 1 part alfalfa meal.

Lot 2 pigs were fed in drylot and received the same protein supplement as lot 1, with 4½ pounds of Terramycin TM-10 added per ton of protein mixture.

Lot 3 pigs were fed in drylot and received the same protein supplement as lot 1, with 4½ pounds of Terramycin TM-10 and 4½ pounds of Oleandomycin premix added per ton of protein mixture.

Table 32 gives the results of this experiment.

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

Table 32

The value of the antibiotics Terramycin (TM-10) and Oleandomycin in the protein supplement for fattening fall pigs in drylot in winter.

December 11, 1958, to March 21, 1959—100 days.

Basal ration fed: Shelled corn, mixed protein supplement in the drylot	Basal	Basal + 4½ lbs. per ton Terramycin TM-10 per ton supplement	Basal + 4½ lbs. Terramycin TM-10, 4½ lbs. Oleandomycin per ton of supplement
Lot number	1	2	3
No. pigs in lot	10	10	10
Av. initial wt. per pig, lbs.	53	53.20	53.40
Av. final wt. per pig, lbs.	181	182.50	189.50
Av. total gain per pig, lbs.	128	129.30	136.10
Av. daily gain per pig, lbs.	1.28	1.29	1.36
Av. daily ration per pig, lbs.:			
Shelled corn	4.19	4.10	4.44
Protein supplement	.71	.69	.74
Lbs. feed per 100 lbs. gain per pig:			
Shelled corn	327.34	317.09	326.45
Protein supplement	55.62	53.75	54.73

Observations

In this experiment the pigs that received the Terramycin (TM-10) and Oleandomycin made the largest daily gains. They exceeded gains made by the lot 2 pigs that received the Terramycin (TM-10) supplement. Quantity of feed consumed per 100 pounds gain of grain and protein supplement varied little.

The results of this experiment seemed to indicate that adding Terramycin (TM-10) to the ration helped some in feed conversion but decreased rate of gain slightly. When both antibiotics were added to the ration, daily gains were a little larger but feed conversion was improved very little.

See note on swine improvement testing facility on page 64.

Sheep

Adaptability of Breeds of Rams and Breed Types of Range Ewes to Market Lamb Production in Kansas. Project 347.

C. S. Menzies, J. D. Wheat, and R. E. John

Western ewes of the three predominant types (Texas ewes or finewools, Northwest blackface crossbreds, and Northwest whiteface crossbreds) commonly found in Kansas were obtained as ewe lambs in the fall of 1951 and bred to Hampshire, Suffolk, Shropshire, and Southdown rams for seven seasons. A different set of rams has been used each year, and the ewes are rotated so that no ewes are bred to the same breed of ram each year. Wool and lamb production records have been kept on the different types of ewes, and lamb production figures have been obtained for the four sire groups. Ewes used in this study will be sold this summer and the results of the past seven years of work will be summarized in the 1960 Feeders' Day circular.

Results and Observations

Lamb production figures for the 1957-58 lamb crop are presented in Table 33, and the preliminary lambing data and lamb production for 1958-59 are shown in Table 34.

Lambs born on or before February 4 were divided by sire groups and fed separately. These lambs were self-fed a pelleted creep ration consisting of 60 percent alfalfa hay, 30 percent grain sorghum, 5 percent cottonseed meal, 5 percent molasses with 15 mgs. Aureomycin added per pound.

Good-quality alfalfa hay was fed in the creep in addition to the pellets. The ewes in the different lots were fed similar rations consisting of approximately 1.25 pounds of grain, 2 pounds alfalfa hay, and 6 pounds of sorghum silage per ewe per day. Feed records were kept on the different groups of lambs.

Table 35 gives the gains and pelleted feed consumption of the different groups of lambs for the 1958-59 year and Table 36 gives the average ewe body weights following lambing in the 1957-58 lambing season, as well as the grease wool produced in 1958.

As in past years, finewool ewes lambed earlier than the other two types of ewes. The blackface ewes lambed an average of 10 days later than the finewools, but 9 days earlier than the whiteface ewes. This year's lambing percentage was low for all groups. Several ewes failed to settle early, and those lambing after February 4 were considered as dry ewes. Dogs got in with these ewes twice before they were due to lamb, killed several ewes, and caused several ewes to lamb prematurely.

In past years there have been no consistent differences among the three types of ewes in lambing and weaning percentages, birth weight of lambs, carcass grade of lambs, or rate gain of lambs. Whiteface crossbred ewes have consistently produced heavier but coarser grading fleeces than the other ewe types.

There have been no consistent differences among the four ram breeds in lambing and weaning percentages, birth weight, or carcass grade of lambs. However, Southdown- and Shropshire-sired lambs have usually, as in this year's results, been lighter at birth than Suffolk- or Hampshire-sired lambs. Suffolk- and Hampshire-sired lambs have usually gained faster than lambs sired by the other two breeds. However, they have been no more efficient in converting feed to gain than have Southdown- or Shropshire-sired lambs.

Table 33

Lamb production by ewes of different types and from sires of different breeds, 1957-58.

	No. ewes bred	No. ewes lambed	No. lambs weaned	% lambs weaned	145-day weight	Average weaning weight	Lbs. of lamb weaned per ewe bred
Ewe groups:							
Finewools	40	40	55	130	105.1	92.5	105.9
N.W. whiteface	38	30	41	108	108.2	92.8	100.1
N.W. blackface	44	36	48	109	107.6	92.5	98.8
Sire groups:							
Hampshire	33	29	37	110	111.5	96.5	115.78
Southdown	33	28	37	116	102.3	86.7	100.25
Suffolk	32	26	35	109	113.6	100.0	109.38
Shropshire	32	23	35	109	101.4	87.0	95.16

Table 34

Lambing data and lamb production from ewes of different types and from sires of different breeds, 1958-59.

	No. ewes bred	No. ewes lambing[1]	Av. lambing date	Av. birth wt., lbs. Singles	Twins	% lambs born	No. lambs alive Mar. 31	Av. wt. lambs Mar. 31
Ewe groups:								
Finewools	44	33	Nov. 26	11.71	9.02	95	31	84
N.W. whiteface	33	24	Dec. 15	11.26	8.95	85	27	80
N.W. blackface	43	26	Dec. 6	11.39	8.35	84	33	81
Sire groups:								
Hampshire	29	20	Dec. 8	11.47	9.24	97	20	79.7
Southdown	29	16	Dec. 20	10.79	8.94	69	19	67.5
Suffolk	31	22	Nov. 23	12.40	9.68	81	22	100.1
Shropshire	31	24	Nov. 30	9.98	8.38	110	30	78.6

1. Ewes lambing after February 4 figured as dry ewes.

Table 35

Pelleted feed consumption and lamb production of lambs from four breeds of rams on three types of ewes.

January 31, 1959, to March 31, 1959—59 days.

	No. of lambs	Daily pellet consumption in creep per lamb	Av. daily gain in pounds per lamb	Gain per lb. of pelleted creep feed consumed
Sire groups:				
Hampshire	21	2.44	.788	.32
Suffolk	23	3.10	.746	.24
Southdown	19	1.81	.654	.36
Shropshire	31	2.43	.609	.25
Ewe groups:				
Finewools	32		.657	
N.W. whiteface	28		.700	
N.W. blackface	34		.682	

Table 36

Body weights and wool production of ewes of different types, 1957-58.

	Grease wool production	Body wts. following lambing, per ewe
Ewe groups:		
Finewools	8.81	145
N.W. whiteface	10.81	171.5
N.W. blackface	8.26	173.5

Lamb Feeding Experiments, 1958-59. Studies Carried on by the Department of Animal Husbandry and the Garden City Branch Experiment Station. Project 111-GC.

Carl Menzies and A. B. Erhart

Six hundred straight-bred Rambouillet wether lambs purchased from near Rocksprings, Texas, were used in these tests. Average weight on September 28 at the loading point was 69.5 pounds. About 16 hours later they weighed 65.8 pounds off the trucks at Garden City. Delivered price was $22.30 per cwt. They were grazed on volunteer wheat until October 25. Average weight at that time was 76.7 pounds.

General Procedure

October 27, lambs were weighed, lotted, and started on test. Lambs were faced and tagged. Seventy-five lambs were shorn and all lambs, except those in lot 9, were drenched with 6 cc. of Trivermol drench. Half the lambs in each lot were implanted with 3 mgs. stilbestrol at the start of the test. Final weights were taken February 12 after 108 days of feeding. Lambs not shorn in October were shorn February 13.

Standard feedlot ration consisted of whole grain sorghum, sorghum silage, alfalfa hay, and cottonseed meal. Lot 7 served as the feedlot control. Lot 9 was not drenched and was fed 30 mgs. hygromycin per lamb per day. Lot 10 was given 2.5 mgs. Tran-Q tranquilizer per lamb per day and lot 2 was drenched twice. December 30, 30 lambs in the "jackpot" lot were started on an exploratory cobalt study.

Two hundred lambs were grazed on volunteer wheat pasture for the entire test. Fifty of these, lot 8, were fed Tran-Q tranquilizer in salt. Seventy-five of the remaining lambs were shorn at the start of the test. Twenty-five of the shorn lambs and 25 unshorn lambs were reimplanted with 3 mgs. stilbestrol 64 days after the start of the test. Lambs in lot 3 were grazed on irrigated wheat pasture.

Two lots of lambs, 5 and 6, were used in a combination feedlot and wheat pasture study. One of these lots grazed on volunteer wheat pasture for 64 days and then changed to the feedlot for the remaining 44 days.

The other lot was started in the feedlot and was then switched to volunteer wheat pasture.

Volunteer wheat came up early and made rapid growth. However, primarily because of lack of moisture, it soon dried out and turned brown. Because of this, lambs pastured on this type wheat were fed about 0.5 pound alfalfa hay and 0.5 pound grain sorghum for the last 40 days of the test.

Prices of Feeds and Additives

Grain sorghum, $1.70 per cwt.; alfalfa hay, $18 per ton; sorghum silage, $6 per ton; cottonseed or soybean oil meal, $70 per ton; salt, $1 per cwt.; wheat pasture, 30 cents per head per month; Hygromix, 50 cents per lb.; Tran-Q per gram of tranquilizer, 80 cents (approximate); stilbestrol implants, 9 cents (approximate).

Observations

Lambs made good gains during the pre-test period even though many exhibited symptoms of internal parasite infestation; 12 had died by February 12. Eleven of them were lost during the first month. One lamb was killed by coyotes. Cause of death was not determined for one lamb. Two died as direct result of heavy stomach worm infestation, and cause of death of eight lambs, seven on wheat pasture, was diagnosed as enterotoxemia, complicated by anemia due to heavy stomach worm infestation.

Results of feedlot tests indicate that lambs not drenched but fed 30 mgs. (30,000 units) of hygromycin per lamb per day gained equally as fast and efficiently as those in lot 7 that were drenched and not fed hygromycin. Hygromycin cost 67 cents per lamb compared with 3 cents per lamb for drench. Lambs in lot 2 were drenched twice but failed to gain faster or more efficiently.

Tran-Q tranquilizer failed to increase gains or feed efficiency in feedlot or on wheat pasture. It was difficult to control level of Tran-Q consumption on wheat pasture. Tran-Q was mixed with salt at a level to supply 2.5 mgs. Tran-Q activity per lamb per day based on salt consumption records obtained on lambs in previous years. However, enough salt was consumed to supply 3.5 mgs. Tran-Q activity per lamb per day. Men working with the lambs reported that lambs fed Tran-Q were quieter than others. This was not observed last year.

Lambs given cobalt bullets gained slightly faster than their controls, but because of the short feeding period and small number on test no definite conclusion can be made.

Small gains were made during the first 64-day period by lambs grazed on volunteer wheat. Because of this all lambs on such pasture were fed .5 pound alfalfa hay and .5 pound sorghum grain per lamb per day, starting January 3. Each lamb gained approximately .10 pound more per day during the last 44 days than during the first 64 days. Shorn lambs gained equally as fast as unshorn lambs. No additional feed, other than a small quantity of alfalfa hay fed when snow covered the wheat, was given to lambs on irrigated wheat. They gained about .05 pound more per lamb per day during the entire test than lambs on volunteer wheat pasture. Cheap gains were made by all lambs on wheat pasture.

Total gain was practically the same for lots 5 and 6. A true comparison between these lots cannot be made because of different periods of time on wheat pasture and in the feedlot and because of variation in quality of wheat pasture at different periods. Feed cost was higher for lot 6 because additional feed was fed while on wheat pasture and because of a longer feedlot period.

Lambs implanted with 3 mgs. stilbestrol in lots on combination wheat pasture feedlot tests, or wheat pasture tests, or in feedlot tests gained 31, 37, and 39 percent faster, respectively, than those not implanted. This amounted to about .10 pound more per lamb per day. Feed efficiency cannot be determined, since implanted and nonimplanted lambs were fed together.

Results of a study comparing lambs receiving no implants, one 3-mg. stilbestrol implant or two 3-mg. stilbestrol implants are reported in Table

Table 37

Results of stilbestrol implants for fattening lambs.

A. 3-mg. stilbestrol implants

	Feedlot tests		Wheat pasture tests		Combination wheat pasture and feedlot tests	
Lot number	2,7,9,10	2,7,9,10	1,3,4,8	1,3,4,8	5,6	5,6
Treatment	No implant	3-mg. stilbestrol implant	No implant	3-mg. stilbestrol implant	No implant	3-mg. stilbestrol implant
Number lambs per treatment	100	100	96	98	49	49
Days on feed	108	108	108	108	108	108
Av. initial wt. per lamb, lbs.	75.8	75.5	74.3	74.7	75.2	75.5
Av. total wt. per lamb, lbs.	106.3	117.4	102.2	113.5	103.7	112.9
Av. total gain per lamb, lbs.	30.5	41.9	27.9	38.8	28.5	37.4
Av. daily gain per lamb, lbs.	.282	.388	.258	.359	.264	.346

B. Reimplanting with stilbestrol on wheat pasture

Lot number	1 and 4	1 and 4	1 and 4
Treatment[1]	No implant	One 3-mg. stilbestrol implant	Received second 3-mg. stilbestrol implant after 64 days
Number lambs per treatment	48	48	49
First period—64 days:			
Av. initial wt. per lamb, lbs.	73.2	73.8	73.4
Av. final wt. per lamb, lbs.	85.1	93.4	92.9
Av. total gain per lamb, lbs.	11.9	19.6	19.5
Av. daily gain per lamb, lbs.	.186	.306	.305
Second period—44 days:			
Av. final wt. per lamb, lbs.	100.1	112.7	115.6
Av. total gain per lamb, lbs.	15.0	19.3	22.7
Av. daily gain per lamb, lbs.	.341	.439	.516
Entire test—108 days:			
Av. total gain per lamb, lbs.	26.9	38.9	42.2
Av. daily gain per lamb, lbs.	.249	.360	.391

1. One half lambs in each treatment group were shorn at the start of the test.

37. Lambs given a second 3-mg. stilbestrol implant after 64 days on test gained 18 percent faster, or .067 pound more per lamb per day during the last 44 days on test than lambs not reimplanted. Over the 108-day trial reimplanted lambs gained .03 pound more per lamb per day than lambs receiving only the initial 3-mg. implant. Lambs implanted with one 3-mg. implant gained 45 percent, or .110 pound more per lamb per day than those not implanted. Reimplanted lambs gained 57 percent, or .140 pound faster per lamb per day than those not implanted.

Average fleece weight for fall-shorn lambs was 4.2 pounds. Lambs shorn on February 12 produced an average of 6.6 pounds of wool.

Charles Pfizer & Co., Inc., Terre Haute, Ind., furnished the stilbestrol implants and Tran-Q tranquilizers used in these tests.

Table 38

Results of lambs on wheat pasture tests.

Lot number	4	1	8	3
Treatment[1 2]	Volunteer wheat pasture, unshorn	Volunteer wheat pasture, shorn	Volunteer wheat pasture, Tran-Q, unshorn	Irrigated wheat pasture, unshorn
Number lambs per lot	48	48	49	49
Days on feed	108	108	108	108
Av. initial wt. per lamb, lbs.	75.4	71.6	75.6	75.4
Av. fleece wt. per lamb, lbs.		4.2		
Av. final wt. per lamb, lbs.	108.4	104.3	104.9	114.0
Av. total gain per lamb, lbs.	33.0	32.7	29.3	38.6
Av. daily gain per lamb, lbs.				
(all lambs):	.306	.303	.271	.357
No hormone	.243	.255	.229	.305
3-mg. stilbestrol implant	.368	.351	.312	.408
First 64 days (all lambs)	.252	.240	.215	.315
Last 44 days (all lambs)	.383	.395	.354	.419
Daily feed per lamb:[3]				
First 64 days:				
Wheat pasture	Free choice	Free choice	Free choice	Free choice
Alfalfa hay	.15	.15	.16	.16
Salt	.012	.012	.013	.013
Last 44 days:				
Wheat pasture	Free choice	Free choice	Free choice	Free choice
Grain sorghum	.44	.44	.44	
Alfalfa hay	.44	.44	.44	
Salt	.011	.011	.017	.013
Av. lbs. feed per cwt. gain:				
Grain sorghum	57.9	58.4	66.5	
Alfalfa hay	86.7	87.4	101.9	
Salt	3.7	3.7	5.5	
Av. feed cost per cwt. gain[4]	$ 5.21	5.21	7.01	3.21
Av. feed cost per lamb[4]	$ 1.72	1.72	2.06	1.24
Cost per lamb on test, 10-27-53[5 6]	$16.14	16.23	16.19	16.14
Number lambs died	2	2	1	1
Cost of lamb loss	$ .67	.65	.30	.35
Av. total cost per lamb[4 5 7]	$18.53	18.60	18.55	17.73
Av. total cost per cwt.[4 5 7]	$17.09	17.14	17.68	15.55

1. One half the lambs in each lot were implanted with 3 mgs. stilbestrol.
2. Lambs in lot 8 consumed an average of 3.5 mgs. Tran-Q activity per lamb per day. This may be higher than actually consumed, as there was probably some salt-Tran-Q mixture wasted.
3. Lots 4 and 1 were pastured together; therefore, feed consumption records are based on average consumption for both lots.
4. Includes cost of stilbestrol implants ($0.09 per implant) and Tran-Q ($0.32 per lamb).
5. Includes cost of drench ($0.03 per lamb).
6. Figured on initial unshorn weight in all lots.
7. Includes cost of lamb loss.

Table 39

Results of lamb-feeding tests during 1958-59, Kansas.

Lot number	7	9	10	2
Treatment[1,2]	Control	Hygromycin	Tran-Q tranquilizer	Double drench
Number lambs per lot	50	50	50	50
Days on feed	108	108	108	108
Av. initial wt. per lamb, lbs.	75.8	75.4	76.0	75.4
Av. final wt. per lamb, lbs.	112.3	111.9	111.6	111.6
Av. total gain per lamb, lbs.	36.5	36.5	35.6	36.2
Av. daily gain per lamb, lbs.	.338	.338	.329	.335
No hormone	.291	.298	.273	.270
3-mg. stilbestrol implant	.386	.378	.386	.399
Daily feed per lamb:				
Whole grain sorghum	1.06	1.06	1.06	1.06
Sorghum silage	3.96	3.70	3.96	3.96
Alfalfa hay	.72	.72	.72	.72
Cottonseed meal	.10	.10	.10	.10
Salt	.023	.020	.024	.023
Hygromycin, mgs.		30		
Tran-Q activity, mgs.			2.5	
Av. lbs. feed per cwt. gain:				
Whole grain sorghum	312.7	313.0	321.1	316.3
Sorghum silage	1169.8	1093.1	1201.4	1183.2
Alfalfa hay	212.9	213.1	218.7	215.4
Cottonseed meal	29.3	29.3	30.1	29.6
Salt	6.8	6.9	7.3	6.8
Av. feed cost per cwt. gain[4]	$11.96	13.56	12.89	12.09
Av. feed cost per lamb[4]	$ 4.37	4.95	4.59	4.37
Cost per lamb per test (10-27-58)[5]	$16.23	16.11	16.27	16.17
Av. total cost per lamb[4,5]	$20.60	21.06	20.86	20.54
Av. total cost per cwt.[4,5]	$18.34	18.82	18.69	18.41

Lot	Jackpot	Jackpot[6]
Treatment	Control[3]	Cobalt bullet[3]
Number of lambs per lot	15	15
Days on feed	44	44
Av. initial wt. per lamb, lbs.	84.8	84.8
Av. final wt. per lamb, lbs.	98.3	101.0
Av. total gain per lamb, lbs.	13.4	16.2
Av. daily gain per lamb, lbs.	.306	.369

1. Twenty-five lambs in each lot implanted with 3 mgs. stilbestrol.

2. Lambs in all lots except 9 were drenched with 6 cc. Trivermol at the beginning of test. Lambs in lot 2 received a second drench 16 days later.

3. Fifteen of 30 lambs in the "jackpot" lot were treated with one cobalt bullet per lamb, 12-30-58.

4. Includes cost of stilbestrol implants ($0.09 per implant) hygromycin ($0.67 per lamb) and Tran-Q ($0.22 per lamb).

5. Includes cost of drench ($0.03 per lamb per treatment).

6. Extra lambs not used in the regular feedlot and wheat pasture tests.

Table 40

Results of combination wheat pasture and feedlot tests.

Lot number	5	6
Treatment[1,2]	Volunteer wheat pasture 64 days, then to feedlot for 44 days	Feedlot for 64 days, then to volunteer wheat pasture for 44 days
Number lambs per lot	50	48
Days on feed	108	108
Wheat pasture	64	64
Feedlot	44	44
Av. initial wt. per lamb, lbs.	75.4	75.3
Av. final wt. per lamb, lbs.	107.6	109.0
Av. total gain per lamb, lbs.	32.2	33.7
Av. daily gain per lamb, lb. (all lambs):	.298	.311
No hormone	.263	.263
3-mg. stilbestrol implant	.332	.360
Wheat pasture period (all lambs)	.258	.264
Feedlot period (all lambs)	.356	.344
Av. daily feed per lamb (feedlot):		
Whole grain sorghum	1.05	1.02
Sorghum silage	4.56	3.55
Alfalfa hay	.72	.72
Cottonseed meal	.10	.10
Salt	.024	.019
Av. daily feed per lamb (w. pasture):		
Whole grain sorghum	0	.43
Alfalfa hay	.15	.43
Salt	.012	.011
Av. lbs. feed per cwt. gain:		
Whole grain sorghum	143.7	250.0
Sorghum silage	623.4	685.3
Alfalfa hay	128.0	194.0
Cottonseed meal	13.4	18.7
Salt	5.5	5.1
Av. feed cost per cwt. gain[3]	$ 8.12	10.02
Av. feed cost per lamb[3]	$ 2.61	3.43
Cost per lamb on test, 10-27-58[4]	$16.14	16.12
Number lambs died	0	2
Cost of lamb loss	$ 0	.71
Av. total cost per lamb[3,4,5]	$18.75	20.26
Av. total cost per cwt.[3,4,5]	$17.43	18.59

1. Twenty-five lambs in each lot implanted with 3-mg. stilbestrol.

2. Because of poor pasture, lambs in lot 6 were fed grain sorghum and alfalfa hay during the 44 days they were on wheat pasture.

3. Includes cost of stilbestrol implants ($0.09 per implant).

4. Includes cost of drench ($0.03 per lamb per treatment).

5. Includes cost of lamb loss.

I. Concentrate:Roughage Ratios in Pelleted Rations for Fattening Lambs. II. 3-mg. Stilbestrol Implants for Lambs Fed Pelleted Rations. Project 230.

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

A summary of three years' study of the relationship of physical balance to the utilization of pelleted and nonpelleted fattening lamb rations was reported in Circular 358. Results of this work indicated the following: (1) the optimum ratio in nonpelleted lamb-fattening rations was 45 percent concentrate to 55 percent roughage; (2) pelleted rations produced faster, more efficient gains than nonpelleted rations; (3) pelleted rations consisting of 40 percent concentrate and 60 percent roughage produced gains as fast and as efficiently as pelleted rations

of 50 percent concentrate and 50 percent roughage; and (4) field-cured alfalfa hay produced faster and more economical gains than dehydrated alfalfa when mixed and pelleted with a concentrate. This year's test was concerned primarily with finding the optimum concentrate to roughage ratio for pelleted lamb fattening rations and with determining the value of feeding loose hay with a complete pelleted ration for lambs. The value of 3-mg. stilbestrol implants also was studied.

Experimental Procedure

One hundred twenty Texas Rambouillet wether lambs were used. Lambs were shorn before starting on test. Three weeks after arrival from the range they were weighed, divided into six lots of 20 lambs each and fed as follows:

Lot 1. Changing ratio: Lambs were started on a 20 percent sorghum grain and 80 percent alfalfa hay pellet. After three weeks they were changed to a 30 percent grain sorghum and 70 percent alfalfa hay pellet. After three more weeks they were changed to, and finished on, a 40 percent grain sorghum and 60 percent alfalfa hay pellet.

Lot 2. 20 percent sorghum grain and 80 percent alfalfa hay, pelleted.

Lot 3. 30 percent sorghum grain and 70 percent alfalfa hay, pelleted.

Lot 4. 40 percent sorghum grain and 60 percent alfalfa hay, pelleted.

Lot 5. 40 percent sorghum grain and 60 percent alfalfa hay, pelleted.

Lot 6. 50 percent sorghum grain and 50 percent alfalfa hay, pelleted.

Lambs in all lots, except those in lot 5, were fed 0.25 pound of chopped alfalfa hay per lamb per day. Pelleted rations were self-fed from the start. Half the lambs in each lot were implanted with 3 mgs. of stilbestrol 21 days after starting on test.

Alfalfa hay used in this test was good-quality hay cut from the same field as that which was pelleted. The sorghum grain was purchased in bulk from a Manhattan mill. The hay was ground through a ¼-inch screen and the sorghum grain was coarsely ground. The hay and sorghum grain were mixed in the various ratios and steam pelleted into 3/16-inch pellets.

Feed prices and processing charges used in determining feed cost per cwt. gain were: ground sorghum grain, $1.70 per cwt.; baled alfalfa hay, $14 per ton; grinding hay for pellets, $5 per ton; chopping hay that was fed loose, $3 per ton; mixing, pelleting, and sacking, $6 per ton. With these prices and charges the 20 percent sorghum grain and 80 percent alfalfa hay pellet cost $28 per ton, the 30 percent sorghum grain and 70 percent alfalfa hay pellet, $29.50 per ton; the 40 percent sorghum grain and 60 percent alfalfa hay pellet, $31 per ton; and the 50 percent sorghum grain-50 percent alfalfa hay pellet, $32.50 per ton.

Results and Discussion

The average daily gain, feed intake, feed consumed per cwt. gain, feed cost per cwt. gain, and carcass grades of the pellet study are shown in Table 41. Results of digestion trials using the rations fed in this test will be reported later. Results of the stilbestrol implant study are summarized in Table 42.

Lambs in all lots made good gains. Lamb gains were not made in relation to grain consumption. The daily grain consumption in pounds based on average pellet consumption for lots 1 through 6, respectively, was 1.20, 0.87, 1.37, 1.64, 1.78, and 1.95. Gains were more closely related to the total net energy consumption, using estimated net energy values for feeds fed as listed in Morrison's "Feeds and Feeding." However, this was not true in every case, as lambs in lot 3 consumed approximately the same estimated net energy as lambs in lot 5, yet lot 3 lambs gained considerably faster.

The pelleted ration fed to lot 3, consisting of 30 percent sorghum grain and 70 percent alfalfa hay, produced faster, more efficient, and cheaper gains than rations fed to the other lots. These results indicate that the concentrate-to-roughage ratio may affect the efficiency of pelleted rations. Results of a digestion study, conducted in connection with the feedlot test, have not been calculated.

There was little difference in rate of gain between lot 4, fed a 40

percent sorghum grain and 60 percent alfalfa hay pellet plus 0.25 pound of loose alfalfa hay, and lot 5, fed the same pelleted ration but no loose hay. Lambs in lots 4 and 6 consumed their loose hay more readily than those in lots 1, 2, and 3. Lambs in lot 2 quite often did not eat the stemmy portion of the 0.25 pound loose hay supplied them.

There were some digestive disturbances in lot 6 at the start of the test. Several lambs went off feed and became stiff. One lamb in lot 4 also went off feed at the first of the test. The lambs were not vaccinated for enterotoxemia. No death loss occurred.

No ill effects due to the pelleted nature of the ration were noted. Stomachs from all lambs in lots 2, 5, and 6 and a few from the other three lots were obtained at the packing plant. The mucus membrane lining the rumen and reticulum appeared normal in all cases.

There was little difference in the USDA carcass grades of the lambs fed the different rations.

Lambs implanted with 3 mgs. of stilbestrol gained considerably faster than those not implanted. Feed efficiency could not be calculated, as implanted and nonimplanted lambs were fed together. There was no relationship between ration and lamb response to stilbestrol. Implanted lambs graded about the same as nonimplanted lambs.

Table 41

Concentrate-to-roughage ratios in pelleted rations for fattening lambs, Kansas, 1958-59.

November 5, 1958, to January 6, 1959—62 days.

Lot number	1	2	3	4	5	6
Ration fed[1 2 3]	Changing ratio[4]	20% sorghum grain, 80% field-cured alfalfa hay	30% sorghum grain, 70% field-cured alfalfa hay	40% sorghum grain, 60% field-cured alfalfa hay	40% sorghum grain, 60% field-cured alfalfa hay	50% sorghum grain, 50% field-cured alfalfa hay
Number lambs per lot	20	20	20	20	20	20
Days on feed	62	62	62	62	62	62
Initial wt. per lamb, lbs.	73.5	73.1	74.2	73.2	74.9	74.7
Final wt. per lamb, lbs.	108.6	107.5	119.9	112.5	113.7	110.7
Total gain per lamb, lbs.	35.1	34.5	45.7	39.3	37.8	36.0
Av. daily gain per lamb, lbs.	.565	.556	.737	.634	.610	.580
No. hormone implant[5]	.422	.461	.602	.537	.520	.473
3-mg. stilbestrol implant[5]	.661	.615	.788	.673	.641	.620
Lbs. feed per lamb daily:						
Pellet	4.28	4.33	4.57	4.10	4.44	3.69
Chopped alfalfa hay	.24	.24	.24	.24		.24
Total feed	4.52	4.57	4.81	4.34	4.44	3.93
Lbs. feed per cwt. gain:						
Pellet	757.2	779.1	620.2	647.3	728.7	635.6
Chopped alfalfa hay	42.8	43.5	32.8	38.2		41.7
Total feed	800.0	822.6	653.0	685.5	728.7	677.3
Feed cost per cwt. gain	$11.55	11.28	9.43	10.36	11.29	10.68
Av. USDA carcass grade[6]	7.4	7.1	7.5	7.6	7.9	7.7

1. Ten lambs in each lot were implanted with 3 mgs. stilbestrol 21 days after the lambs went on test.

2. Pelleted rations were fed free choice from the beginning of the test.

3. Lambs in all lots except No. 5 received approximately 0.25 pound chopped alfalfa per lamb per day in addition to the pelleted rations.

4. Received a pellet consisting of 20% sorghum grain, 80% alfalfa hay for the first 21 days; then changed to a 30% sorghum grain-70% alfalfa hay pellet for the next 21 days; and for the last 20 days received a 40% sorghum grain-60% alfalfa hay pellet.

5. Figured for a 41-day period.

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

Table 42

Three mgs. stilbestrol implants for fattening lambs fed pelleted rations.[1]

November 26, 1958, to January 6, 1959—41 days.

	Number lambs	Days on test	Initial wt. per lamb, lbs.	Final wt. per lamb, lbs.	Total gain per lamb, lbs.	Av. daily gain per lamb, lbs.	Av. USDA carcass grade[2]
No implant	60	41	88.3	108.9	20.6	.502	7.6
3 mgs. stilbestrol implant	60	41	87.7	115.0	27.3	.666	7.4

1. Ten lambs in each of the six lots listed in Table 41 were implanted with 3 mgs. stilbestrol 21 days after the pelleted ration test began.

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

Table 43

Chemical analysis[1] of feeds used in Garden City lamb feeding trials, 1958-59.

Sample	% dry matter	% moisture	% ash	% ether extract	% crude fiber	% protein	% N.F.E.
1. Irrigated wheat	25.79	74.21	3.62	0.83	4.94	7.39	9.01
2. Dryland wheat	30.65	69.35	3.45	1.14	5.36	7.76	12.94
3. Sorghum silage	27.51	72.49	2.08	0.51	8.00	1.44	15.48
4. Alfalfa hay	88.36	11.64	9.63	1.37	26.82	17.56	32.98
5. R.S. Milo 650	90.98	9.02	1.58	2.81	3.04	9.95	73.60
6. Westland milo	91.22	8.78	1.72	2.86	3.77	8.19	74.68

1. On an as-fed basis.

Kansas Swine Improvement Association Testing Facility

The swine testing station was built and put into operation during the past year. The facilities are located on Kansas State University property about three miles northwest of the Animal Industries building. Members of the Animal Husbandry Department staff are managing the station and providing necessary technical assistance.

The station was entirely built and paid for by private funds contributed to the Kansas Swine Improvement Association. Swine producers, feed companies, equipment manufacturers, banks, cooperative associations, market foundations and other interested individuals and firms cooperated in making construction of the station possible. As it stands today the station represents approximately $8,000 in cash contributions, plus approximately $4,000 in donated equipment and building materials.

Thirty-seven of the forty pens were filled in the first test, which was completed in March, 1959. In the first test average feed efficiency for all boars completing the test was 305 pounds of feed per 100 pounds of gain, with a high of 344 pounds and a low of 270 pounds. Average daily gain was 1.98 pounds per day with a high of 2.54 pounds and a low of 1.55 pounds per day. And average backfat thickness of the boars was 1.09 inches with a high of 1.61 inches and a low of 0.68 inch.

All boars with an overall index of 100.0 or more were offered in the sale on March 28, 1959. The 66 boars sold for an average price of $158.02 with a top of $550.

The second test is under way and every pen has been reserved. The next sale of tested boars will be sometime late in August.

Feed Prices Used in Beef Cattle Tests[1]

	1957-58	1958-59
Sorghum grain, cwt., ground	$ 2.00	$ 2.10
Sorghum grain pellets, cwt.		2.25
Corn, cwt., ground	2.30	2.25
Soybean meal, ton	67.00	80.00
Alfalfa hay, ton	16.00	11.00
Alfalfa hay pellets, ton		23.00
Prairie hay, ton	14.00	11.50
Wheat straw, ton	12.00	11.00
Molasses, ton	40.00	40.00
Urea molasses, ton	80.00	80.00
Ammoniated blackstrap molasses, ton	45.00	45.00
Forage sorghum silage, ton		5.00
Dehydrated forage sorghum pellets, ton (est.) (grinding and pelleting—$12, dehydrating—$8, silage—$5)		25.00
Grain sorghum silage, ton		10.00
Dehydrated grain sorghum pellets, ton ($30, processing)		50.00
Bluestem pasture, summer, per head:		
Yearling	16.00	14.00
Two-year-old	20.00	18.00
Bluestem pasture, winter, per head per month:		
Calf	.50	.50
Yearling	.75	.75
Salt, cwt.	1.20	1.10
Ground limestone, cwt.	1.00	1.00
Bonemeal	6.00	6.15
Aurofac 2A, per pound	.60	.60
Stilbestrol implants	.09	.09
Tran-Q, per gram of tranquilizer		.80

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

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